

FLIGHT

The
**AIRCRAFT
ENGINEER
AND
AIRSHIPS**

First Aero Weekly in the World.

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

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EDITORIAL COMMENT

BY her successful double journey across the Atlantic the airship R 34 has erected another milestone, additional to the one we recorded last week, on the long road of aerial navigation. It may be true that she has done no more than was expected of her by those who knew the capabilities of the rigid airship, but it is just as true that her voyage will be of inestimable value from the point of view of propaganda. She has demonstrated for the education of the layman that long-distance aerial service for the carriage of passengers and mails is not only a possibility of to-morrow, but the accomplished fact of to-day. She has further demonstrated that it is possible for the airship to voyage to a time-table, and that stress of weather can be combatted successfully with almost as great certainty as by the ocean liner. Lest this should seem to be too great a claim to make, we would remind the reader that on her outward voyage R 34 encountered at one time a head wind of some fifty knots velocity, and that

nothing but the possible exhaustion of her fuel supplies caused a moment's anxiety to her commander and crew. The obvious lesson to be drawn from this is that the air liner of the future must be of greater size and possessed of ample fuel reserves to allow for such circumstances of weather as R 34 actually encountered.

We notice that some of the newspapers in their comments on the flight make rather a point of the hurried departure of the ship from America on account of the warning of the U.S. Weather Bureau that a depression was advancing from the Great Lakes. This is used to point the moral that there is a long way to go yet before regular airship services will be possible over such routes as the Atlantic. We agree that we have by no means reached the ultimate development of the airship, and that ships of the future will be much more advanced in design and construction than we are able to appreciate to-day. As R 34 is to the original Zeppelin, so will the airship, possibly even of 1921, be to existing types. But we do not think it is altogether fair to the airship to make capital for counter-argument out of the hurried departure from America. This was principally due to the fact that R 34 was moored out, owing to there being no sheds capable of accommodating a craft of her size, and that to have remained was to have courted disaster. The giant airship without a shed is as much at the mercy of the elements as a ship without a harbour. No seaman would remain at anchor in an open roadstead with fires drawn if he had received warning of a gale expected from seaward. Nor, if he took the wiser counsel and proceeded to sea to avoid the risk of being driven on to a lee shore, would anyone argue that the steamship is insufficiently developed to be a reliable means of transport. It seems to us that the real lesson to be drawn from the incident is that before airship services can be properly developed, sheds, which are to the airship what harbours are to ships, must be provided. That is fully appreciated by those who stand behind the airship and its development for commercial purposes, and it is, to say the least, a little unfair that the want of proper accommodation should be used as an argument against the craft itself.

There remains now nothing to be done but to congratulate Major Scott and his officers and crew on the

successful consummation of their object. They have credited Britain with yet another record in aerial travel which will stand for all time, and will mark the first really successful attempt to demonstrate that the airship is, so far as human vision can foresee, the real aerial vehicle for sustained flight. They have shown us that the modern rigid airship is capable of keeping the air for at least 100 hours, and of being navigated with the precision and certainty of a steamship. Last, but by no means least, they have confirmed in the eyes of the whole world the commanding lead this country has achieved in aerial navigation. All honour to them.

**Speeding
the
Commercial
Side**

Whatever may be thought of the parsimonious attitude of the Treasury towards commercial aviation—and it cannot be argued that the grant of a mere half-million of money is generosity—it cannot be denied that the Air Ministry is doing its level best to encourage development and further the interests of the British industry in foreign countries. There was the recent flight to Spain of several machines of diverse types, which has done a great deal to interest the Spaniards in aerial navigation, and particularly in the reliability of the British machine. Then came the Atlantic voyage of R 34, which, as we have said elsewhere, has accomplished an enormous amount of good which must have a very favourable reflex on the industry. Now the Air Ministry has again risen to the occasion by sending two flying boats of the F 5 type for a nine-days' trip to Norway, Sweden and Denmark. The route to be followed is from Felixtowe to Dundee, Christiansand, Christiania, Copenhagen, Stockholm, Goteborg and Esbjerg, and so back to Felixstowe direct. The total distance to be covered is about 2,380 miles.

It is a very wise move to have sent these craft across to visit the Scandinavian ports. There should be business to be done in these countries, which, by reason of their extended coast-line, offer peculiar facilities for services conducted by flying boats. Even where routes lie overland, there are large areas of water—as for instance between Goteborg, over the chain of lakes in North Denmark to Esbjerg—which render Scandinavia eminently the territory for the exploitation of this type of aircraft. Apart from these points, which are important enough to have justified the enterprise, it is just as well that we should be early in the field. The Germans, who are going to be dangerous competitors in the commercial field, have been trying to get a footing in the Scandinavian countries. Indeed, it is understood that they have already succeeded in obtaining a certain number of orders for aircraft from Sweden. We are, fortunately, a long way ahead of Germany in the design and construction of aircraft of every kind, and particularly so in that of the seaplane and the flying boat. It is now for the industry to follow up the missionary work of the Air Ministry, and see that the development of aerial services in Scandinavia falls to us, and not to our late enemies.

**Peace
Joy-Flights**

The Air Ministry has announced that, pending a definite agreement in accordance with the Air Convention, and in order to enable French and British aircraft firms to send machines to London and Paris, should they so desire during the Peace celebrations, arrangements

have been made with the French Government for the opening of civil communication by air between the two capitals from July 13 to 20, inclusive. British machines visiting Paris will land at Le Bourget only, and French machines visiting London at Hounslow, except in emergency. All machines will cross the French coast between Calais and Boulogne, and the English coast between Folkestone and Dungeness. All machines must be provided with and carry certificates of airworthiness issued by their respective Governments, while passports must be carried by all civilian passengers.

The concessions thus made for the current week are graceful in their conception, but we are not inclined to think they are being taken advantage of to any great extent. The notice, for one thing, has been too short to permit of arrangements being made, while the idea of the casual British civilian deciding to fly to Paris in peace week, and succeeding in securing a passport in time to take the journey is humorous, when we remember the vagaries and delays of the Passport Office. Perhaps, however, the authorities of this department made up their mind to celebrate peace week by abandoning for a season the policy of delay and circumlocution which, as a rule, is attendant upon the issue of passports, even when these are required for urgent purposes of business.

**Coal
and
Industry**

No more disquieting announcement has been made since the end of the War than that conveying the intimation that, as from Wednesday—since temporarily postponed until Monday next—the price of coal is to be advanced by no less than six shillings per ton. Whether it is viewed from the point of view of the domestic consumer, or of industries—in which aviation now plays a conspicuous part—which depend for the ability to compete in the markets of the world on a plentiful supply of cheap fuel, the outlook is black and discouraging in the extreme. And the worst of it is that the increase is, in the main, the result of the prevailing policy of organised Labour to get all it can for as little as it can give. If it were the result of what might be called temporary and accidental causes it would be bad enough at the moment, but there would still be hope for the future. As it is, we can only say that if this policy of grab and disregard of the interests of the community is persisted in, then good-bye to all hope of re-establishing industry, and to every chance of placing this country once more on a sound and solvent commercial basis.

So far as the aircraft industry is concerned, this wicked addition to the cost of coal must result in greatly increased costs of working. For example, it will add at least £1 per ton to the cost of steel, which is even now at a figure which is disquietingly high. Indeed, not to labour the point unduly, it may be said that, even if no other results were to follow, the net consequence would be that the prices of all materials must rise by at least from 10 to 12 per cent. But it is certain that other results must follow hard on the heels of this increase which has been necessitated by the overbearing demands of the miners. All these things follow in a vicious circle. There is not an industry or a commodity in general use which will not be affected. Prices will rise, and it will inevitably result in demands for more and more wages to meet the extra cost of living, until a point is reached at which it will be utterly impossible

Flight—And the Men



"Flight" Copyright.

Mr. H. OSWALD SHORT, Managing Director of Messrs. Short Brothers.

for us to maintain our overseas trade, upon which we rely for our very existence as a commercial power. That is the present outlook, unless organised Labour can be got to see sense, and be content to give a real day's work for a day's wages. One of the fundamental facts which Labour seems quite unable to grasp is that Capital, as represented by the employer, has no objection in the world to paying high wages. We have yet to meet the employer of up-to-date ideals who cares whether his men earn five pounds a week or fifty, so long as they earn it. They have the prevision to see that we must strive, under the new conditions resulting from the War, for output and yet more output, and that to attain the objective every producer must give of his best. Nothing less will do, if we are not to sink to the commercial level of Spain.

Labour's idea of the Millennium, however, seems to be a state in which men may draw a full week's wages for two days' work, and make merry for the other five. That is obvious from the state of things obtaining in the mining industry, in which absenteeism rises in direct ratio to increase of wages. It is all very well for the leaders to assert that output is handicapped by the want of facilities for clearing the coal after it has been won, and by the absence of proper machinery. There may be trouble in both these directions, and it may be that the whole industry wants reorganisation from top to bottom. But that does not dispose of the figures relating to absenteeism which show that after every rise in wages the inclination is to work shorter hours and do less work, when

actually at the coal face. Nor is the complaint peculiar to the mining industry. Right through the ranks of Labour the same disposition is to be observed. There is no recognition of the task that lies before us; no thought for the community as a whole; and no symptom of sane foresight. The general movement is for less work and more money for doing it.

We have no complaint against Labour for demanding its fair share of the wealth it assists to create. Far from that, we most willingly concede that in the past, in some directions, Labour has not shared as it should have done, and it is quite right to insist that this shall be altered. But there are limits to the share that either Capital or Labour can safely demand for its work, and if they are exceeded, then there is nothing but disaster ahead. We have spoken of the price of steel, which is a fair example of the effect that outrageous demands by Labour is having on our industries. Contracts for very large quantities of steel work have gone to America because our manufacturers cannot quote a price within £5 per ton of the

American producer, and the extra cost of coal will bring the adverse margin up to £6 per ton, because it requires some three tons of coal to produce a ton of steel. How can we hope to remain solvent and get back to our commercial status when things are like they are? It is very much to be hoped that the shock the community has received will do good by causing Labour to reflect that by demanding more than industry can stand it is killing the goose which lays the golden eggs.



Bridging the Gap.

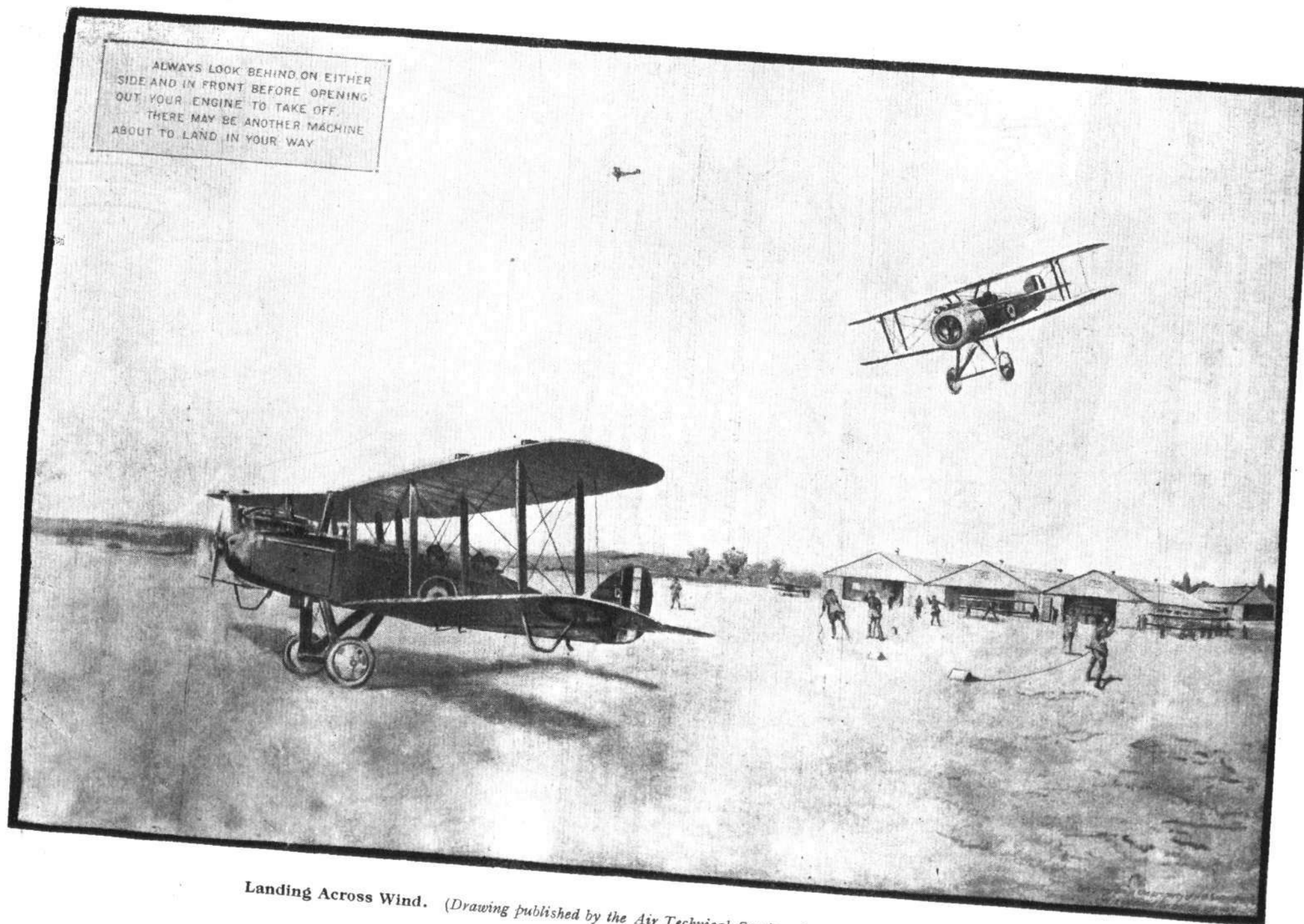
The Rhine Area Control

In the agreement between the United States, Belgium, the British Empire, and France, and Germany with regard to the military occupation of the territories of the Rhine (issued as a White Paper Cd. 222) Article, 8 mentions that the German Government undertakes to place at the disposal of the Allied and Associated troops and to maintain in good state of repair all the military establishments required, including aviation grounds.

Flying-Boats to Tour Scandinavia

Two British flying-boats—4041 and 4044—of the F 5 type fitted with two 350 h.p. Eagle VII Rolls-Royce engines, left Felixstowe at 9.15 a.m. on July 11 on the first stage of a trip to Norway, Sweden and Denmark. One of the machines reached Dundee at 3.20 p.m., but the other had to come down at Orford Bay (Suffolk) soon after 11 a.m. owing to fog. The latter continued her journey on the following day and in very stormy weather flew to Dundee in six hours.

ALWAYS LOOK BEHIND ON EITHER
SIDE AND IN FRONT BEFORE OPENING
OUT YOUR ENGINE TO TAKE OFF
THERE MAY BE ANOTHER MACHINE
ABOUT TO LAND IN YOUR WAY



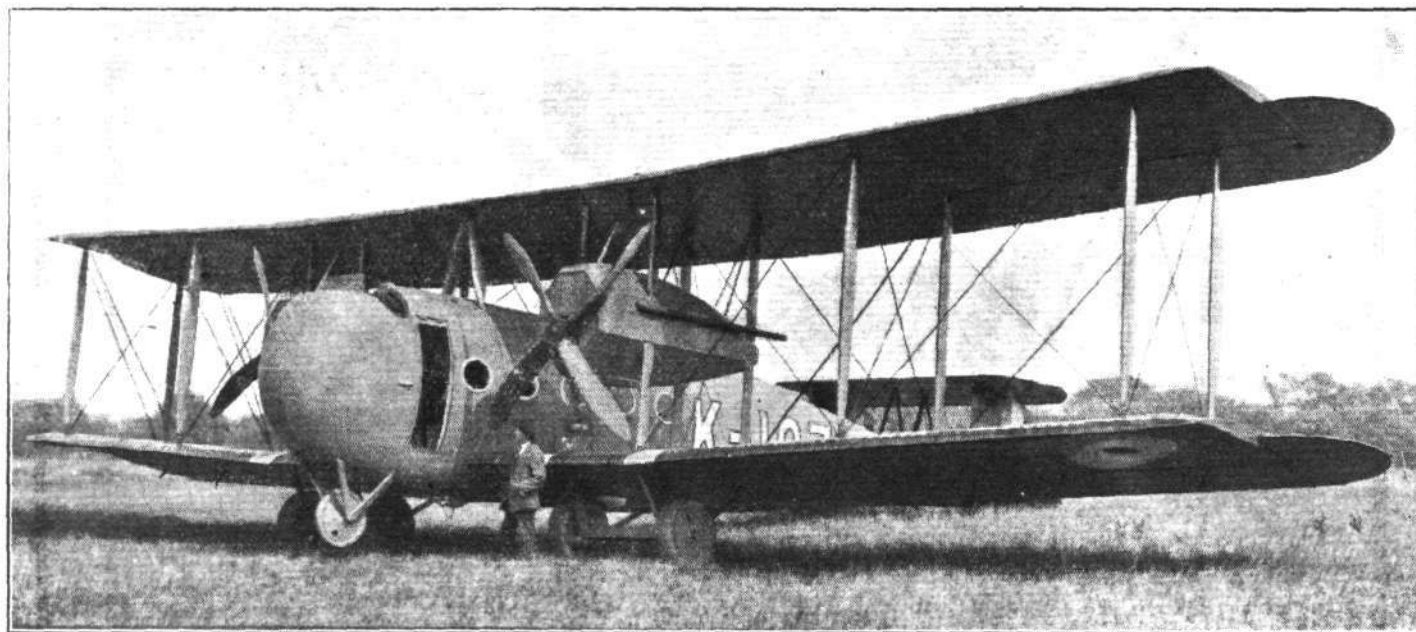
Landing Across Wind. (Drawing published by the Air Technical Services for use at the R.A.F. Schools.)

THE VICKERS "VIMY-COMMERCIAL" BIPLANE

WHEN you take one of the ten comfortable seats in the Vickers "Vimy-Commercial" biplane and look around the handsomely-furnished, spacious cabin, and out of one of the small circular windows at your

machines as this can be designed and made successfully to fulfil all that is required of them.

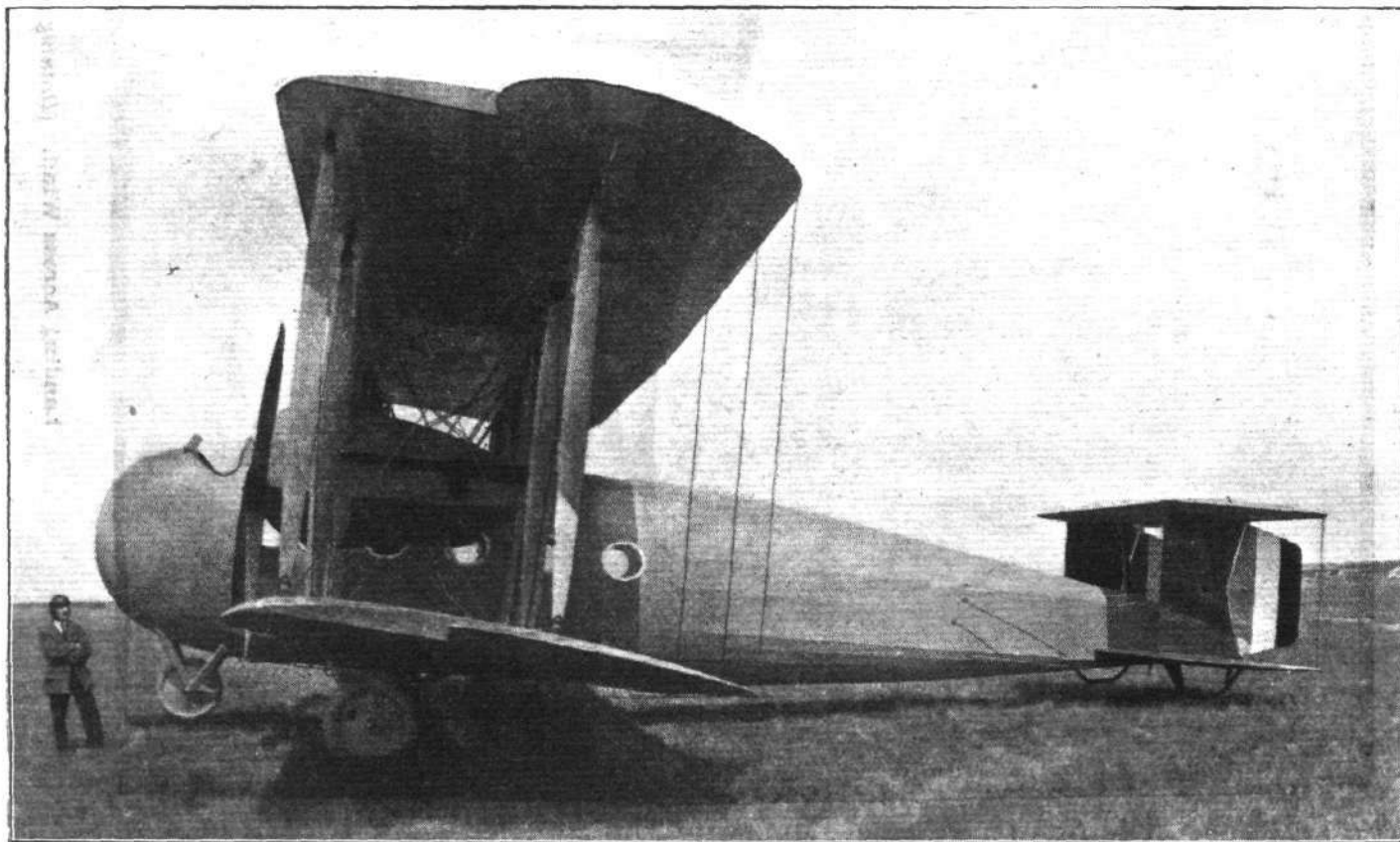
In the case of the Vickers "Vimy-Commercial," the achievement to this end is all the more remarkable



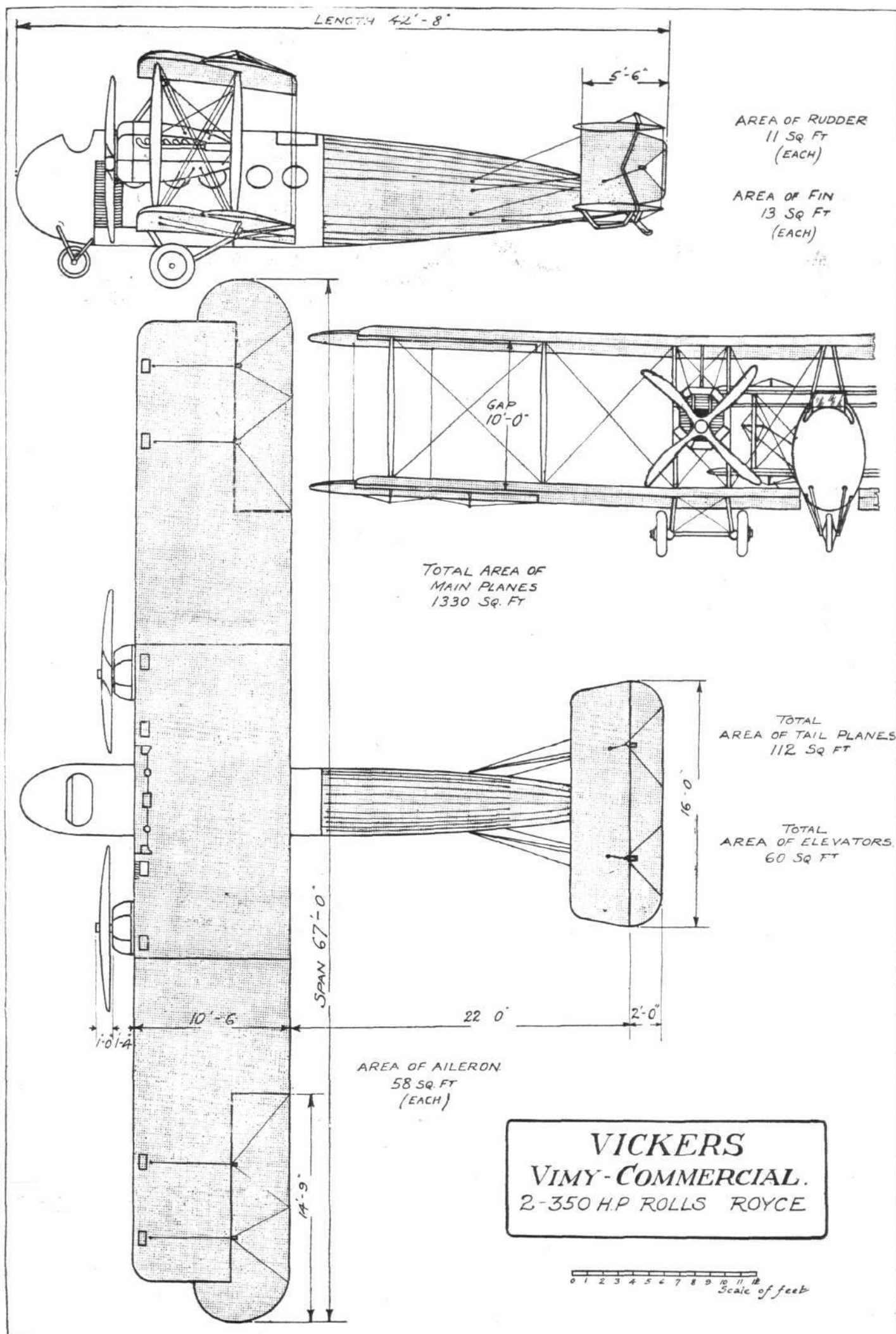
Three-quarter front view of the Vickers "Vimy-Commercial" biplane

side, nothing strikes you as being at all out of the ordinary; you accept it as a matter of daily fact. It is only when the machine is up in the air with its load of passengers that you realise the true significance of things, and what an enormous stride has been made towards practical commercial aviation, when such

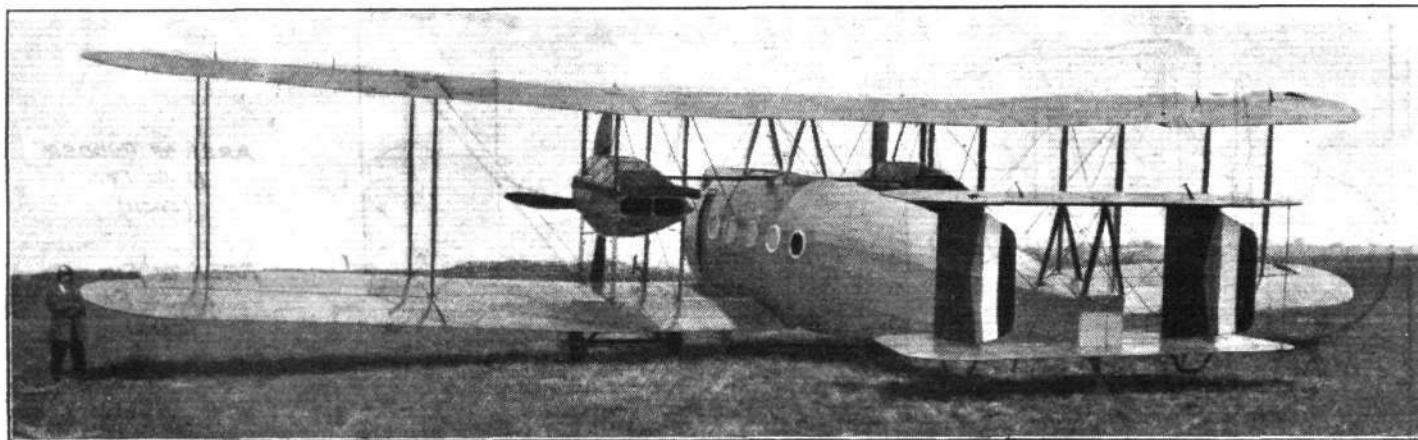
when it is remembered that this machine is a standard War model, modified only to meet its new and more peaceful requirements. In fact, except for the fuselage, this machine is identical to the "Vimy" Bomber; merely changing from one fuselage to the other—which can be done quite easily—transforms



Side view of the Vickers "Vimy-Commercial" biplane



THE VICKERS "VIMY-COMMERCIAL" BIPLANE: Plan, side and front elevations to scale

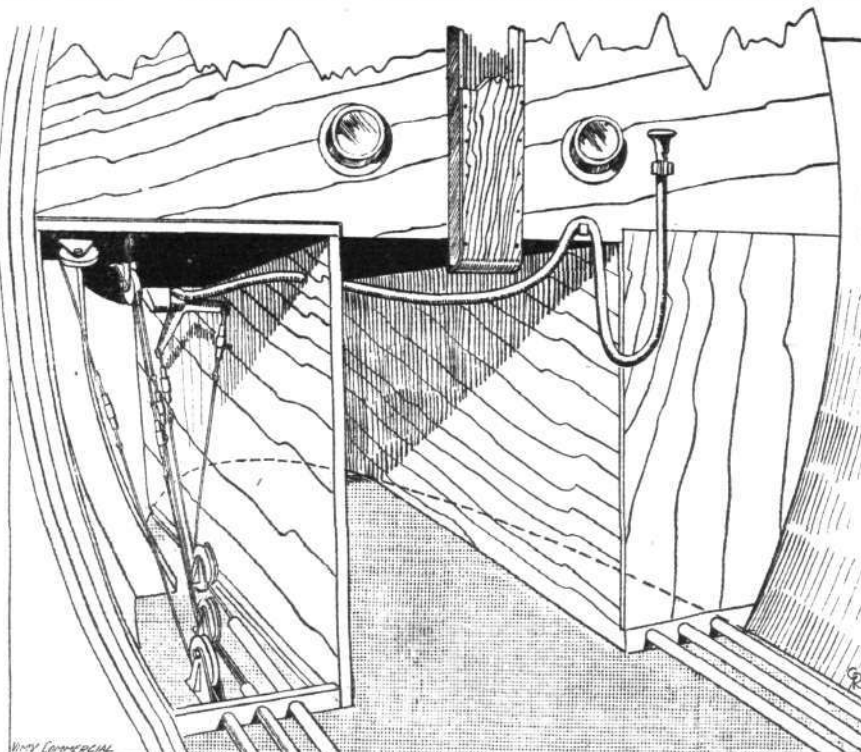


Three-quarter rear view of the Vickers "Vimy-Commercial" biplane

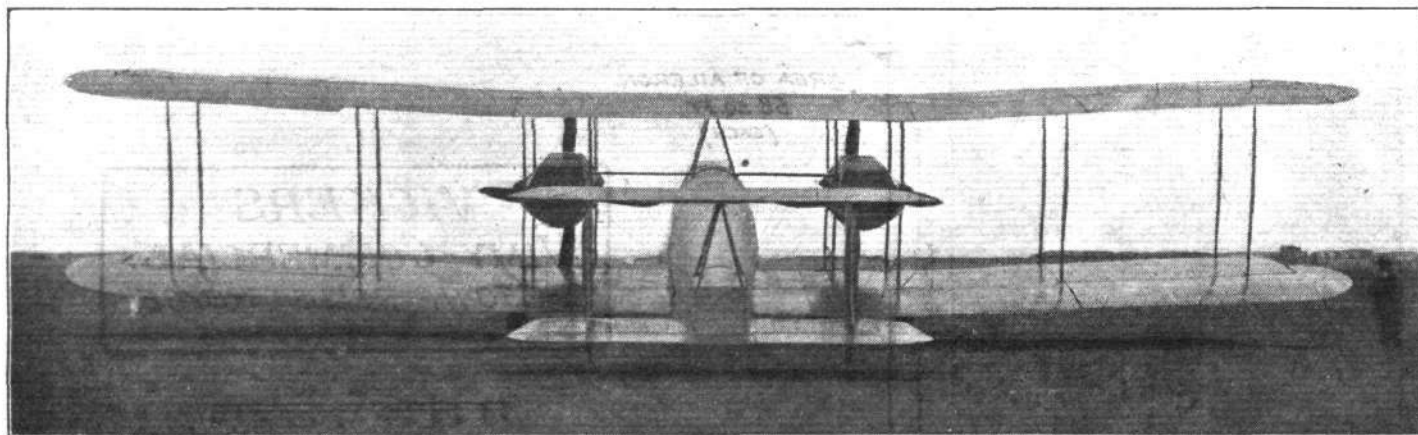
it from a peaceful general utility vehicle to a deadly weapon of war. This is a feature not to be ignored, in spite of the prevalent talk of "no more wars." The Millennium has not yet arrived.

In describing the "Vimy-Commercial," therefore, we will confine most of our remarks to the *fuselage*, having given the general characteristics of the Vimy Bomber in "Milestones" for FLIGHT of June 12 last. The *fuselage* is built up in two portions, the front half comprising the pilot's cockpit, passengers' and luggage cabin, tanks, etc., and the rear half carrying the tail. The forward or cabin portion is of *monocoque* construction, elliptical in cross-section; the shell, or outer covering, is not of the usual three-ply as generally employed in *monocoque* construction, but consists of a modification of the same known as "Consuta"—a system evolved by Messrs. S. E. Saunders, Ltd., of Cowes, who are now allied with the Vickers Company. In the "Consuta" construction, layers of selected spruce are placed with the grain located diagonally, glued and sewn together, each row of stitching being spaced about $1\frac{1}{2}$ ins. apart. By this means considerable strength is obtained, which greatly increases the factor of safety of the whole construction of the *fuselage*.

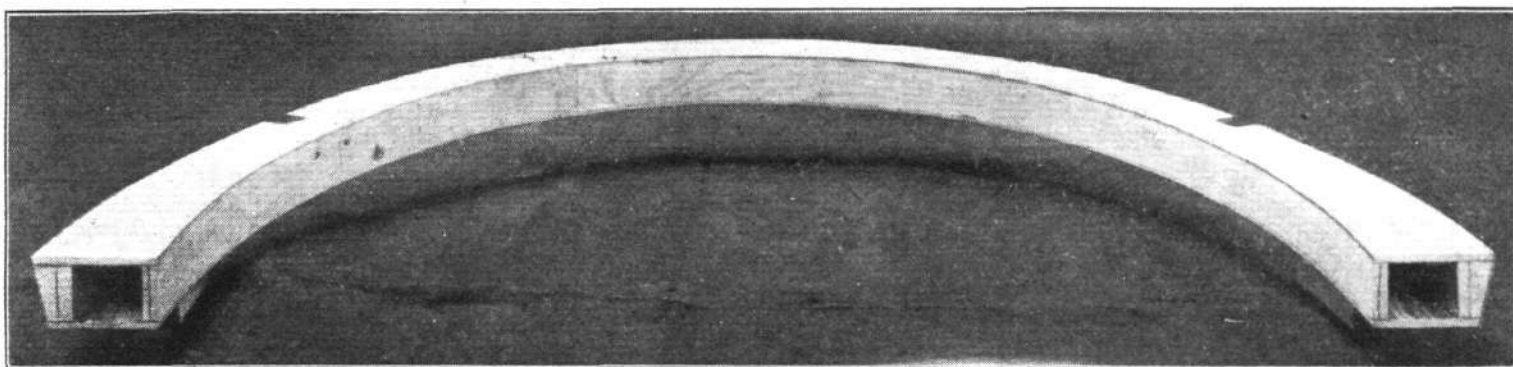
The shell is attached to box-section formers built up of three-ply, as shown in one of the accompanying illustrations. On each side of the cabin are circular



Sketch showing the recesses, in the fore part of the cabin, giving access to the control cables. The conduit conveying the engine controls will be seen in the centre.



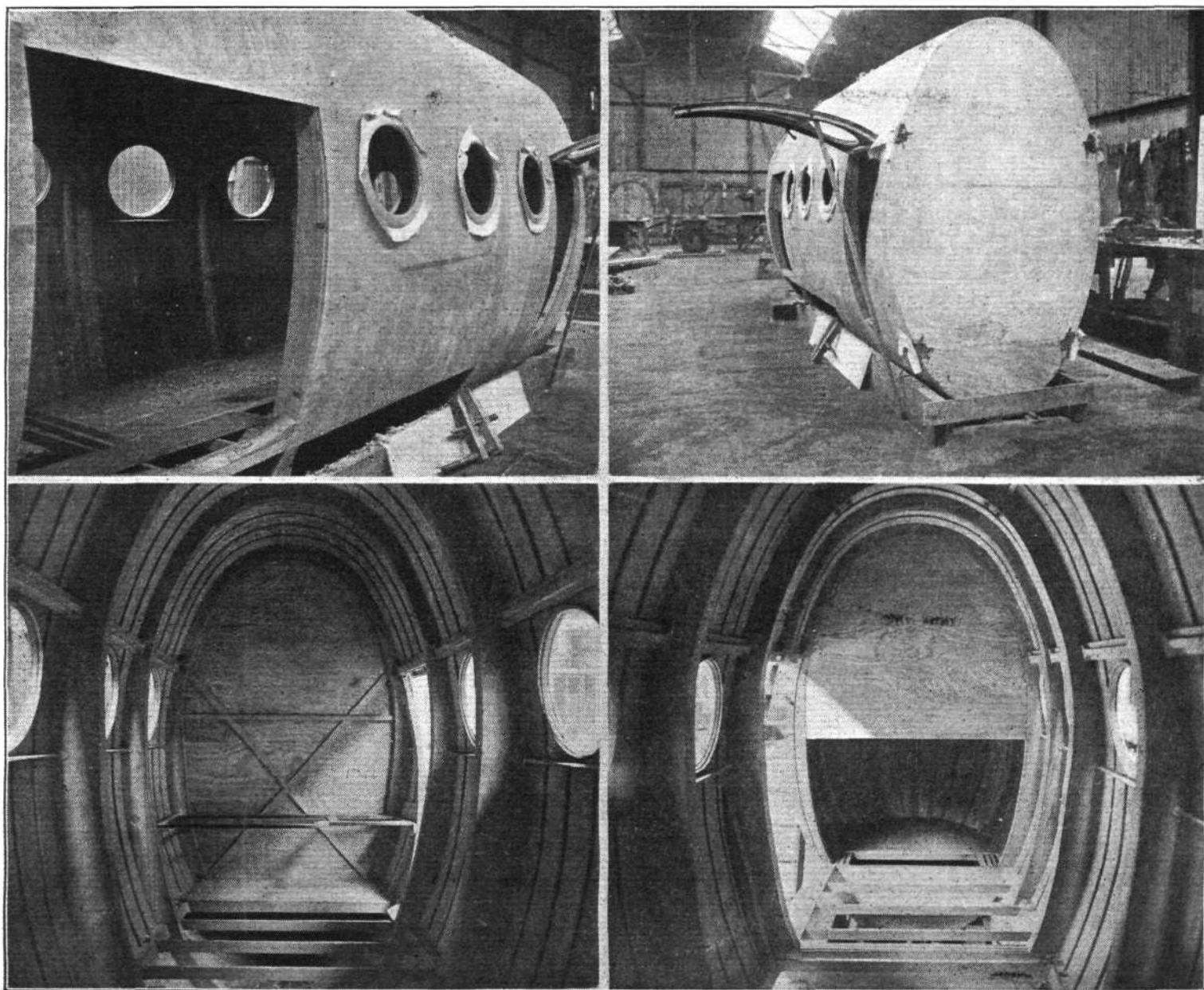
Rear view of the Vickers "Vimy-Commercial" biplane



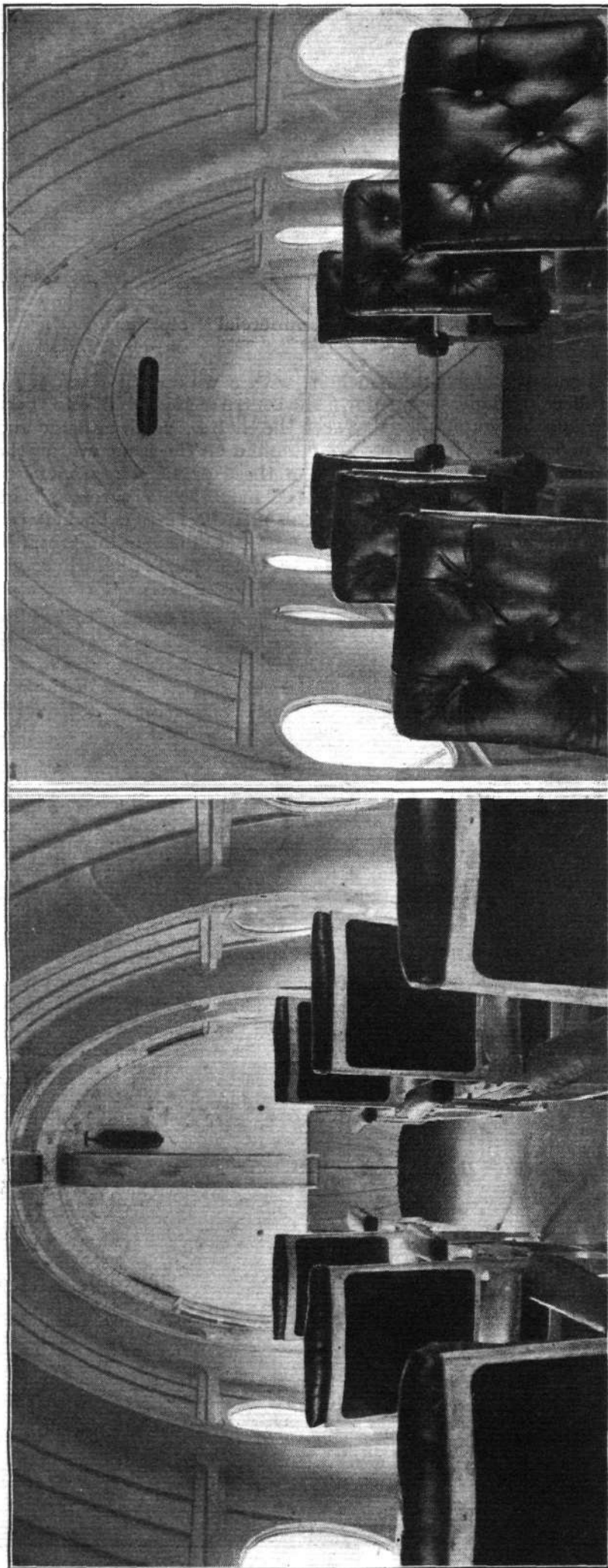
One of the box-formers for the *fuselage* of the Vickers "Vimy-Commercial" biplane

portholes glazed with Triplex, and at the forward end of the cabin, on the port side, is a door of the roller-shutter type. It is of interest to note that the whole of this fore part of the *fuselage*, including the door and windows, is watertight, enabling the machine, should occasion arise, to float in a normal position with safety on the water. The cabin, which is thus totally enclosed, has a seating capacity for ten passengers, each one of which has a separate and very

comfortable armchair, with a window at the side; a gangway runs down the centre of the cabin, and there is ample space between the chairs. Both altitude and speed indicators are mounted on the front wall of the cabin for the benefit of these passengers anxious to be kept informed of the machine's progress. Telephonic conversation can also be carried on between the passengers and the pilot. Cupboards are provided at the end of the cabin for the storage of light luggage.



THE VICKERS "VIMY-COMMERCIAL" BIPLANE: Four views showing the cabin under construction



THE VICKERS "VIMY-COMMERCIAL" BIPLANE: Two views of the interior of the "luxurious" cabin. On the left, looking forward, and on the right, looking aft. It should be noted that it is not quite finished, and several fittings have to be added.

In the roof of the cabin are adjustable ventilators and a trap-door, the latter at the rear of the cabin. Noise and vibration have been reduced to a minimum, in fact, the safety and comfort of the passengers has been considered in every way possible.

High up in the nose of the *fuselage* is the pilots' cockpit, where accommodation is provided for two pilots seated side by side, with, of course, dual control. In this position a very wide range of vision is obtained. The lay-out of the various controls is extremely neat; the *aileron*, elevator and rudder control wires are led from the pilots' cockpit to port and starboard recesses in front wall of the cabin, where access is given for adjustment, etc. This is illustrated by one of the accompanying sketches. From these recesses the cables are led through aluminium tubes along the floor of the cabin. The engine controls (throttle, ignition, radiator shutters, etc.) are taken from the bottom of the pilots' cockpit through a conduit running up the front wall of the cabin, along the roof, and thence out to the engines through metal streamlined casings. The conduits have polished mahogany covers, which enhance the general appearance of the interior of the cabin. The control is fitted with a compensating device so that the machine can be flown "hands off" at any speed, whether level, climbing, or gliding.

Very little alteration is necessary in converting the machine for mails and freight carrying. The seats in the cabin can be detached in a few minutes, giving a floor area of 53 sq. ft., and a volumetric capacity of 300 cubic ft. for freight, which can be kept at an even temperature and dry. The maximum weight which can be carried is 2,500 lbs., just over one ton.

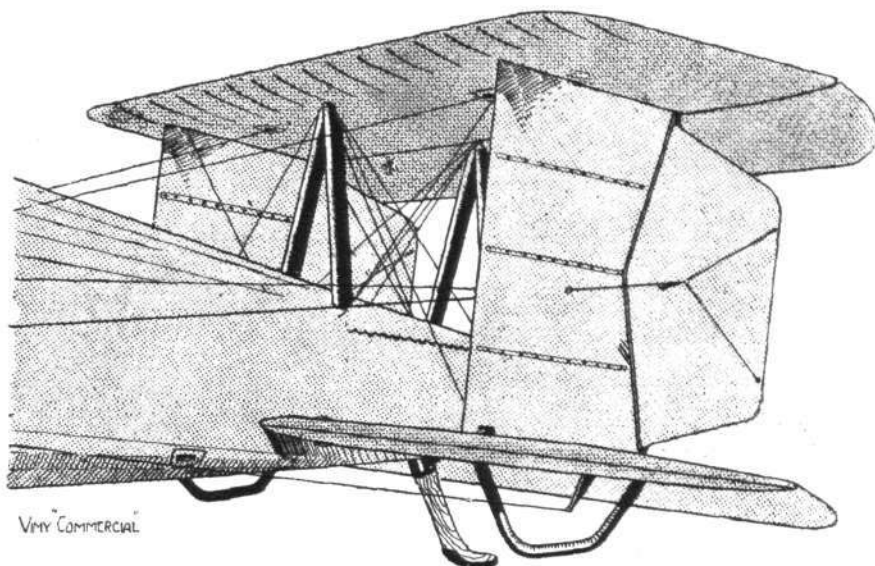
When Mail carrying, sorting boxes are fitted, and the process of Sorting can be carried out on similar lines to the arrangements now in operation on the mail trains. Mail bags can be released attached to parachutes, and dropped where necessary between terminal stations, thus reducing the time and cost of a journey.

The rear portion of the *fuselage* is of the standard Vickers construction of wood and swaged tie rod, and Vickers-Ryan patent *longerons*. The fuel tanks are located beneath the floor of the cabin, and follow the streamline contour of the *fuselage*. A constant petrol supply is maintained by a windmill pump under each engine, which draws petrol from

the main tanks and delivers it to a service tank in the leading edge of the top plane centre section; an overflow returns any surplus petrol to the main tank.

As previously stated, the remainder of the machine is of standard Vimy construction. The main planes are in seven sections, three in the top plane, comprising a straight centre section to which are attached the outer sections at a dihedral angle of $3\frac{1}{2}$ degs., and four for the lower plane, the centre section of which, whilst having the same overall span as the top one, is divided into two sections, one on each side of the fuselage. The lower outer sections also have a dihedral of $3\frac{1}{2}$ degs. The main spars are of box section spruce and three-ply wood bound with fabric, and the interplane struts are of hollow spruce, except in the engine bay where the struts are of round steel tube, reinforced where necessary and with wooden fairings; the ribs are of spruce. The engine mounts are carried on four struts each side, and the chassis is attached below the engine mountings, thus minimising the load in the antilift wires. Throughout the machine, streamline steel tie rods are used in external bracing, and round steel rods in all internal bracing; looped wires and ferrules are not used in any important part. In no part has solidity and strength of construction been sacrificed to lightness, a factor of safety of $4\frac{1}{2}$ being provided throughout the machine.

The biplane tail of the Vickers "Vimy-Commercial."



300 cub. ft., which is equivalent in displacement to a load of $7\frac{1}{2}$ cubic tons.

Fuel Used

When slightly throttled so that the speed of the machine is 90 m.p.h., the engines consume the following quantities of petrol and oil:—

Petrol.—An average of $17\frac{1}{2}$ galls. per engine per hour.
Oil.—An average of 1 gall. per engine per hour.

The following are some further particulars of the "Vimy-Commercial":—

Overall length	42 ft. 8 ins.	Area of main	
Overall height	15 ft. 3 ins.	planes	1,330 sq. ft.
Span	67 ft. 0 ins.	Weight per sq.	
Gap	10 ft. 0 ins.	foot	8.4 lbs.
Chord	10 ft. 6 ins.	Weight per h.p.	16.4 lbs.

Engines

Two Rolls-Royce "Eagle" 8 engines or two "Liberty" engines are fitted. The machine will fly with one engine out of action.

Weights and Load, with Rolls-Royce "Eagle" 8 engines or "Liberty" engine:—

Weight empty	lbs.	Oil for 5 hours	lbs.
water	7,292	Useful load, either	190
Reserve water (4 gal- lons)	40	passengers, mails, or goods, including pilot	2,308
Petrol for 5 hours	1,290	Total	11,120

Speed with Full Load

Near ground	109 m.p.h.	Landing	45 m.p.h.
At 6,000 ft.	103 "	One engine	70 "
At 10,000 ft.	99 "		

Climb with Full Load

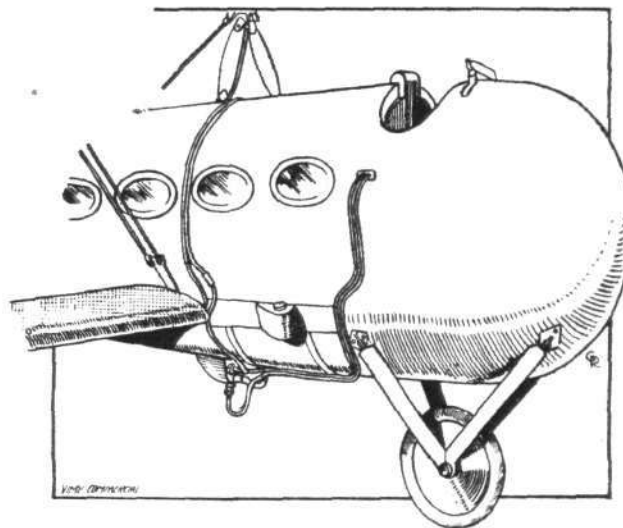
To 6,000 ft.	17 mins.	To 10,000 ft.	48 mins.
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Endurance with Full Load

Fuel for five hours at 90 m.p.h. is carried, which means that the machine will cover a distance of 450 miles without landing. If necessary the endurance can be increased by lessening the amount of the useful load, e.g., if a non-stop journey of 900 miles is required, the useful load will amount to 1,000 lbs., or five passengers and baggage.

Useful Load

The load that the machine will take is just over one ton; and arrangements are made whereby (a) eleven passengers and one pilot or (b) one ton dead weight of mails or goods, or (c) any combination of (a) and (b) can be carried. The internal capacity of the machine behind the pilot's seat is



Sketch showing the mounting of the main petrol tanks under the cabin of the Vickers "Vimy-Commercial"

Sir John Hunter Resigns from Air Ministry

THE Secretary to the Air Ministry announces that Sir John Hunter, K.B.E., Administrator of Works and Buildings in the Air Ministry, has tendered his resignation to the Secretary of State for Air, and that this resignation has been accepted in view of the progress made in clearing up the War work of the Ministry and the desire of Sir John Hunter to return to his private business as soon as possible. An intimation of the cordial thanks of the Air Council has been conveyed to Sir John Hunter for the eminent services rendered by him from December, 1917, to the present date, in dealing with the very heavy programme of works necessitated by the rapid expansion of the Royal Air Force.

R.A.F. in Victory March

IN connection with the Victory March through London on Saturday, the R.A.F. will contribute a contingent of 55 officers and 605 men, and the W.R.A.F. 4 officers and 120 ranks. Nineteen squadrons from the Army of Occupation will be represented, together with personnel from the four Areas and from the 29th and 11th Groups. These numbers will be exclusive of the G.O.C. and Staff. Maj.-Gen. Sir J. M. Salmond, K.C.B., C.M.G., C.V.O., D.S.O., commanding the R.A.F. in the field, will be in command of the contingent, with Brig.-Gen. G. L. Lambe, C.M.G. D.S.O., as his Chief Staff officer. There will also be a strong representation from the Anti-Aircraft Stations.

THE ROYAL AERO CLUB OF THE U.K.

OFFICIAL NOTICES TO MEMBERS

SPECIAL COMMITTEE MEETING

A SPECIAL MEETING of The Committee was held on Tuesday last, July 15, 1919, when there were present:—Brig.-Gen. Sir Capel Holden, K.C.B., F.R.S., in the Chair, Maj.-Gen. Sir Sefton Branker, K.C.B., Mr. Ernest C. Bucknall, Lieut.-Col. Spenser D. A. Grey, D.S.O., R.A.F., Lieut.-Col. T. O'B. Hubbard, M.C., R.A.F., Lieut.-Col. F. K. McClean, Lieut.-Col. Alec Ogilvie, Col. C. R. Samson, D.S.O., R.A.F., Mr. A. Mortimer Singer, Mr. T. O. M. Sopwith and Mr. Harold E. Perrin, Secretary.

Election of Members.—The following New Members were elected:—

Maj. Thomas Morgan Barlow, R.A.F.
Capt. John Claude Beddard, R.A.F.
Lieut. Edgar Hastings Cambridge.
Lieut.-Com. Kenneth Mackenzie Grieve, R.N.
Lieut. Albert Charles Guyer, R.A.F.
Lieut. Harold William Hern, R.A.F.
Nicolas Herzmark.
James Inglis Ker, J.P.
Francis Martin Luther.
Lieut. John Marsden, R.A.F.
Emil Adam Merckel.
Lieut. William Thomas Simpson.
Capt. Maurice Hugh Stephens, R.A.F.
Lieut. Bernard Noel Wills, R.A.F.

Royal Aero Club and Society of British Aircraft Constructors.—An Agreement has been entered into between the Royal Aero Club and the Society of British Aircraft Constructors defining the activities of the respective bodies.

A joint Committee has been appointed to act as the channel of communication by which the two bodies are kept in touch and to advise generally upon matters affecting their common interests.

The following are the representatives of the Club on the Joint Committee:—

Lieut.-Col. F. K. McClean.
Lieut.-Col. J. T. C. Moore-Brabazon, M.P.
Mr. J. H. Nicholson.
Lieut.-Col. Alec Ogilvie.

N.C. 4.—The following letter was read from Lieut.-Com. H. C. Read, U.S.N., Commanding N.C. 4:—

"U.S.S. *Zeppelin*,
"At sea en route New York,
"June 18, 1919.

"Royal Aero Club,
"3, Clifford Street, W.,
"London, England.

"GENTLEMEN,—I am taking this opportunity, the first peaceful moment since first arriving at Plymouth, to thank you on behalf of myself and the crew of N.C. 4 most heartily for your welcome to us during our stay in London.

"As a consequence of the care with which the members of the Club looked after our welfare, the visit to London will always remain the brightest spot of the entire trip.

"Hoping some day to be able to repay you, at least, in part, I remain,

"Very sincerely yours,

"(Signed) H. C. READ,

Lieut.-Commander, U.S.N.,

"Commanding N.C. 4."

R 34.—The following cablegram was sent to Brig.-Gen. E. M. Maitland, C.M.G., D.S.O.:—

"Royal Aero Club sends heartiest congratulations to Major Scott and Crew of R 34.

"ATHOLL,

"Chairman."

The following reply was received from Gen. Maitland:—

"President Royal Aero Club, London.

"Scott and Crew R 34 much appreciate kind messages congratulation.

"GENERAL MAITLAND."

Committee Meetings.—It was decided that meetings of the Committee should be held in future on alternate Wednesdays, instead of Tuesdays.

Club Banquet to Brig.-Gen. E. M. Maitland, C.M.G., D.S.O., Major G. H. Scott, and the Crew of H.M.A. R 34.

The Club will entertain the Officers and Crew of H.M.A. R 34 at a Banquet at Prince's, Piccadilly, W., on Wednesday, July 23, 1919.

Particulars are being forwarded to members by post.

Jacques Schneider International Race.

The Race for the Jacques Schneider International Trophy will be held on Wednesday, September 10, 1919, at Bournemouth. The course will be over a circuit of about 30 miles, starting from Bournemouth, and taking in Swanage and Christchurch.

Messrs. S. E. Saunders, Ltd., the well-known yacht and aircraft builders, of Cowes, Isle of Wight, have kindly placed their new erecting shops and slipways at the disposal of the Club for the accommodation of the competing machines.

Machines representing the British Empire must be ready not later than September 1, 1919.

The Committee of the Royal Aero Club will select the three competitors to represent the British Empire, and reserves to itself the right to hold eliminating trials.

Entries are to be made to the Royal Aero Club, 3, Clifford Street, London, W. 1, not later than July 31, 1919. Each entry must be accompanied by the Entry Fee of £20.

Royal Aero Club Peace Celebrations.

In order that the House Staff may have a holiday, the House Committee has decided that no meals shall be served in the Club on Saturday, July 19, 1919.

BY ORDER,

July 15, 1919.

HOUSE COMMITTEE.

Offices: THE ROYAL AERO CLUB,

3, CLIFFORD STREET, LONDON, W. 1.

H. E. PERRIN, Secretary.

THE PEACE TERMS

THE following clauses affecting aeronautics appear in the Peace Treaty now ratified by Germany:—

PART V.—Military, Naval, and Aerial Clauses

In order to render possible the initiation of a general limitation of the armaments of all nations, Germany undertakes strictly to observe the military, naval, and air clauses which follow.

SECTION III.—Air Clauses

ARTICLE 198

The armed forces of Germany must not include any military or naval air forces.

Germany may, during a period not extending beyond October 1, 1919, maintain a maximum number of 100 seaplanes or flying boats, which shall be exclusively employed in searching for submarine mines, shall be furnished with the necessary equipment for this purpose, and shall in no case carry arms, munitions, or bombs of any nature whatever.

In addition to the engines installed in the seaplanes or flying boats above mentioned, one spare engine may be provided for each engine of each of these craft.

No dirigible shall be kept.

ARTICLE 199

Within two months from the coming into force of the present Treaty the personnel of the air forces on the rolls of the German land and sea forces shall be demobilised. Up to October 1, 1919, however, Germany may keep and

maintain a total number of 1,000 men, including officers, for the whole of the cadres and personnel, flying and non-flying, of all formations and establishments.

ARTICLE 200

Until the complete evacuation of German territory by the Allied and Associated troops, the aircraft of the Allied and Associated Powers shall enjoy in Germany freedom of passage through the air, freedom of transit and of landing.

ARTICLE 201

During the six months following the coming into force of the present Treaty, the manufacture and importation of aircraft, parts of aircraft, engines for aircraft, and parts of engines for aircraft, shall be forbidden in all German territory.

ARTICLE 202

On the coming into force of the present Treaty, all military and naval aeronautical material, except the machines mentioned in the second and third paragraphs of Article 198, must be delivered to the Governments of the Principal Allied and Associated Powers.

Delivery must be effected at such places as the said Governments may select, and must be completed within three months.

In particular, this material will include all items under the following heads which are or have been in use or were designed for warlike purposes:—

Complete aeroplanes and seaplanes, as well as those being manufactured, repaired or assembled.

Dirigibles able to take the air, being manufactured, repaired or assembled.

Plant for the manufacture of hydrogen.

Dirigible sheds and shelters of every kind for aircraft.

Pending their delivery, dirigibles will, at the expense of Germany, be maintained inflated with hydrogen; the plant for the manufacture of hydrogen, as well as the sheds for dirigibles, may, at the discretion of the said Powers, be left to Germany until the time when the dirigibles are handed over.

Engines for aircraft.

Nacelles and fuselages.

Armament (guns, machine guns, light machine guns, bomb-dropping apparatus, torpedo-dropping apparatus, synchronisation apparatus, aiming apparatus).

Munitions (cartridges, shells, bombs loaded or unloaded, stocks of explosives or of material for their manufacture).

Instruments for use on aircraft.

Wireless apparatus and photographic or cinematograph apparatus for use on aircraft.

Component parts of any of the items under the preceding heads.

The material referred to above shall not be removed without special permission from the said Government.

SECTION IV.—Inter-Allied Commissions of Control

ARTICLE 203

All the military, naval and air clauses contained in the present Treaty, for the execution of which a time-limit is prescribed, shall be executed by Germany under the control of Inter-Allied Commissions specially appointed for this purpose by the Principal Allied and Associated Powers.

ARTICLE 210

The Aeronautical Inter-Allied Commission of Control will represent the Governments of the Principal Allied and Associated Powers in dealing with the German Government in all matters concerning the execution of the air clauses.

In particular it will be its duty to make an inventory of the aeronautical material existing in German territory, to inspect aeroplane, balloon and motor manufactories, and factories producing arms, munitions and explosives capable of being used by aircraft, to visit all aerodromes, sheds, landing grounds, parks and depots, to authorise, where necessary, a removal of material and to take delivery of such material.

The German Government must furnish to the Aeronautical Inter-Allied Commission of Control all such information and legislative, administrative or other documents which the Commission may consider necessary to ensure the complete execution of the air clauses, and in particular a list of the personnel belonging to all the German Air Services, and of the existing material, as well as of that in process of manufacture or on order, and a list of all establishments working for aviation, of their positions, and of all sheds and landing grounds.

PART VIII.—Reparation. Annex 1

Compensation may be claimed from Germany under Article 232 above in respect of the total damage under the following categories:—

Damage to injured persons and to surviving dependents by personal injury to or death of civilians caused by acts of war, including bombardments or other attacks on land, on sea, or from the air, and all the direct consequences thereof, and of all operations of war by the two groups of belligerents wherever arising.



“WAR SEAL” MODEL COMPETITION

ON Thursday afternoon last the “Knights of the Air,” Capt. Sir John Alcock, and Lieut. Sir Arthur Whitten Brown, visited the exhibition of War Models which has been organised by Messrs. Thomas Parsons and Sons at their showrooms, 315-317, Oxford Street, London, in aid of the War Seal Foundation.

Nearly a quarter of a million people have visited this exhibition, and up to the end of June last over £11,000 has been collected and handed over to the War Seal Foundation. This latter, as no doubt some of our readers know, is an institution for providing comfortable residential flats for totally disabled Service men and their families, founded by Sir Oswald Stoll. Already 72 residential flats, together with buildings and equipment for giving massage, electrical treatment, etc., have been erected at Fulham, but there is still plenty to be done, so those of our readers who are interested may care to obtain further particulars from the Secretary at 10, Charing Cross Road, W.C. 2.

The primary object of the above visit was to present

Damage in respect of all property wherever situated belonging to any of the Allied or Associated States or their nationals, with the exception of naval and military works or materials, which has been carried off, seized, injured or destroyed by the acts of Germany or her allies on land, on sea or from the air, or damage directly in consequence of hostilities or of any operations of war.

PART XI.—Aerial Navigation

ARTICLE 313

The [aircraft of the Allied and Associated Powers shall have full liberty of passage and landing over and in the territory and territorial waters of Germany, and shall enjoy the same privileges as German aircraft, particularly in case of distress by land or sea.

ARTICLE 314

The aircraft of the Allied and Associated Powers shall, while in transit to any foreign country whatever, enjoy the right of flying over the territory and territorial waters of Germany without landing, subject always to any regulations which may be made by Germany, and which shall be applicable equally to the aircraft of Germany and to those of the Allied and Associated countries.

ARTICLE 315

All aerodromes in Germany open to national public traffic shall be open for the aircraft of the Allied and Associated Powers, and in any such aerodrome such aircraft shall be treated on a footing of equality with German aircraft as regards charges of every description, including charges for landing and accommodation.

ARTICLE 316

Subject to the present provisions, the rights of passage, transit and landing, provided for in Articles 313, 314, and 315, are subject to the observance of such regulations as Germany may consider it necessary to enact, but such regulations shall be applied without distinction to German aircraft and to those of the Allied and Associated countries.

ARTICLE 317

Certificates of nationality, airworthiness, or competency and licences, issued or recognised as valid by any of the Allied or Associated Powers, shall be recognised in Germany as valid and as equivalent to the certificates and licences issued by Germany.

ARTICLE 318

As regards internal commercial air traffic, the aircraft of the Allied and Associated Powers shall enjoy in Germany most favoured nation treatment.

ARTICLE 319

Germany undertakes to enforce the necessary measures to ensure that all German aircraft flying over her territory shall comply with the Rules as to lights and signals, Rules of the Air and Rules for Air Traffic on and in the neighbourhood of aerodromes, which have been laid down in the Convention relative to Aerial Navigation concluded between the Allied and Associated Powers.

ARTICLE 320

The obligations imposed by the preceding provisions shall remain in force until January 1, 1923, unless before that date Germany shall have been admitted into the League of Nations or shall have been authorised, by consent of the Allied and Associated Powers, to adhere to the Convention relative to Aerial Navigation concluded between those Powers.

the prizes won in the model-making competition inaugurated by the above firm. There were two sections in this competition, a senior and a junior, Sir John Alcock presenting the prizes in the former, and Sir Arthur Whitten Brown the latter. The prizes were as follows:—

Senior Section

- 1st.—Model—H.M.S. *Princess Royal*. Mr. L. F. Rudd, £60.
- 2nd.—Horizontal engine. Mr. H. C. Duffield, £30.
- 3rd.—Renault air-cooled engine. Mr. F. Williams, £15.

Junior Section

- 1st.—Model—Handley-Page aeroplane. Mr. J. R. Baker, £25.
- 2nd.—Hospital ship. Mr. E. J. Thring, £15.
- 3rd.—Fokker aeroplane. Mr. G. H. S. MacCallum, £10.

There were also five consolation prizes of £3 each in the junior section. It was a very happy thought on the part of one of the consolation winners to present Sir Arthur Brown with a beautifully-made model of the “Vimy”—an act that was much appreciated.



AIRSHIPS



THE RETURN VOYAGE OF R 34

THE R 34 now has the double journey across the Atlantic to her credit. She made a somewhat hurried start, as it was reported that a storm was approaching from the Great Lakes; she arrived safely at Pulham, the airship station in Norfolk, early on Sunday morning after a voyage which had taken 75 hours and three minutes.

The Air Ministry state that the airship was first sighted on the north side of Pulham at 5.56 G.M.T., her position being about 15 miles away, and her course almost due east. Turning south towards the Airship Station she circled over Pulham about 6.22, flying at 800 ft., landing safely at 6.56 G.M.T., exactly an hour after she was first sighted.

The landing at Pulham was thus described by *The Times* correspondent:—

"The British airship R 34 landed at Pulham aerodrome, 14 miles from Norwich, this morning a few minutes after 8 o'clock. She had accomplished the flight from Long Island in 75 hours three minutes.



Maj. G. H. Scott, R.A.F., commander of R 34.

"We began to watch for the airship at 6 o'clock. Reports through the night indicated that that was the earliest moment at which she could arrive. Towards 4.30 the R 34 had been reported over Derby, and it was nearly 7 o'clock when we saw her at last coming out of the mist.

"She might have been a cloud herself in shape and hue and seemingly slow movement. She was creeping out of the north-west, flying at 1,500 ft., and not until she was almost overhead could a sound be heard from her. At a quarter to 6 parties of men had brought out the guide ropes and placed them in readiness on the ground. As the airship began to circle the aerodrome the crews were mustered and took up their positions on the ropes, forming a lane. The airship dipped and headed for it, but rose again suddenly and swept overhead as if unwilling at last to come to earth.

"There was a rapid exchange of signals by flashlight between Maj. Scott and a signal party on the ground respecting barometric pressure and then the R 34 swung round again, dived rapidly towards the ground, and flattened out. A rope was flung out from her; a score of orders were shouted through a megaphone; cable ends were joined; and in five minutes the landing party had the airship under control and were hauling her nearer and nearer to the ground.

"The sudden ejection of her water ballast and the emptying of her water storage tanks occurred at the moment when the R.A.F. band, much depleted by week-end leave, struck up "See the Conquering Hero comes." A moment later the airship was being walked by the guide rope crews, still directed through Capt. R. A. Cochrane's megaphone, to her shed, and Gen. Maitland leant from the forward gondola and handed me a letter addressed to the Editor of *The Times*, the first to be delivered on English soil from an airship. Upon the envelope was written, 'By kindness of the officers of R 34.'

"Not for a second did the airship get out of control. Steadily and without a hitch she was moved across the wide meadow, always entirely in hand. Then her bow was turned and stern first she was brought into the shed and moored.

"Gen. Maitland, who was wearing the blue uniform of the R.A.F., was the first to disembark. He was followed by Maj. Scott. They were met by Lieut.-Col. Boothby, commanding the air station, and the officers and crew were taken to the camp for breakfast. Pulham aerodrome is vast and flat.

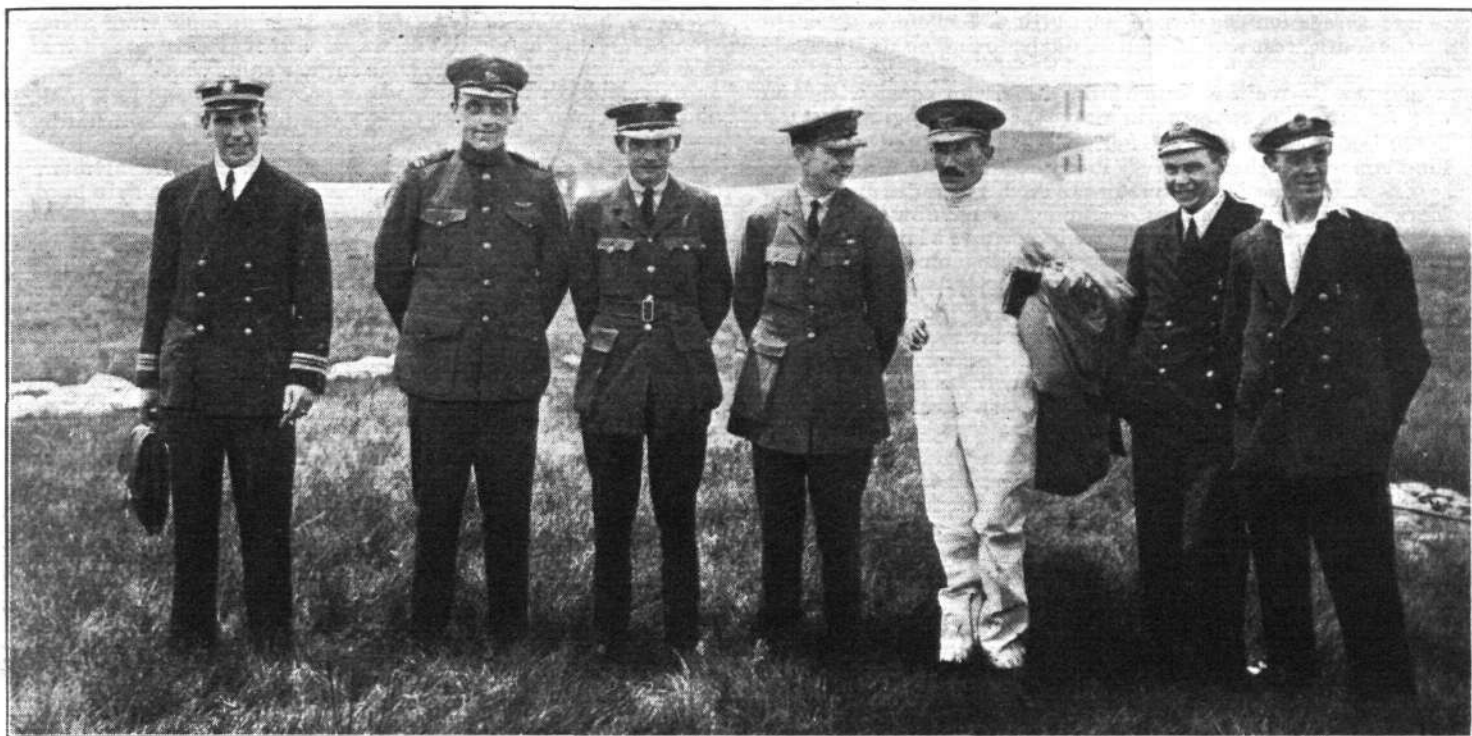
"The R 34 came home to-day on four of her five engines, and finished the flight with 1,000 gallons of petrol to spare. Half-way across the Atlantic the engine in her stern gondola went wholly out of commission, the connecting-rod breaking and going clean through the crank-case. Otherwise she shows little sign of the severity of the test she has just undergone. The repairs to her envelope can be detected, but the damage itself was trifling."

The story of the progress across the Atlantic is thus told in Gen. Maitland's log, which was issued by the Air Ministry an hour after the airship landed:—

The Log of the R 34

It is a dark night, and a gusty wind is blowing from the S.W., strength about 30 m.p.h. We steer straight for New York, and stop, as promised, to fly over the city before heading out into the Atlantic. It was an extremely good "get-away," considering the gusty wind and difficult conditions generally. We find we have 4,600 gallons of petrol for the return journey.

New York at midnight looks wonderful from above. Miles and miles of tiny bright twinkly lights—a veritable fairyland. The searchlights at first make a very unsuccessful search for us, but finally get us fair and square. We are over Fifth Avenue. The Times Square and Broadway present a remarkable sight. We distinctly see thousands of upturned faces in spite of the early hour, 1 o'clock in the morning, and the whole scene is lit by the gigantic electrical signs which seem to concentrate about this point. One in particular, the Overland Tower, illustrates the enormous



• **OFFICERS ON BOARD R 34 UPON THE OUTWARD JOURNEY:** A photograph taken at Roosevelt Field, Mineola, just after they had landed on American soil. From left to right: Lieut.-Comdr. Zachary Lansdowne, U.S.N., Lieut. R. F. Durrant, Lieut. Guy Harris, Maj. J. E. M. Pritchard, Brig.-Gen. E. M. Maitland, C.M.G., D.S.O., Lieut. H. Luck and Lieut. J. D. Shotter.

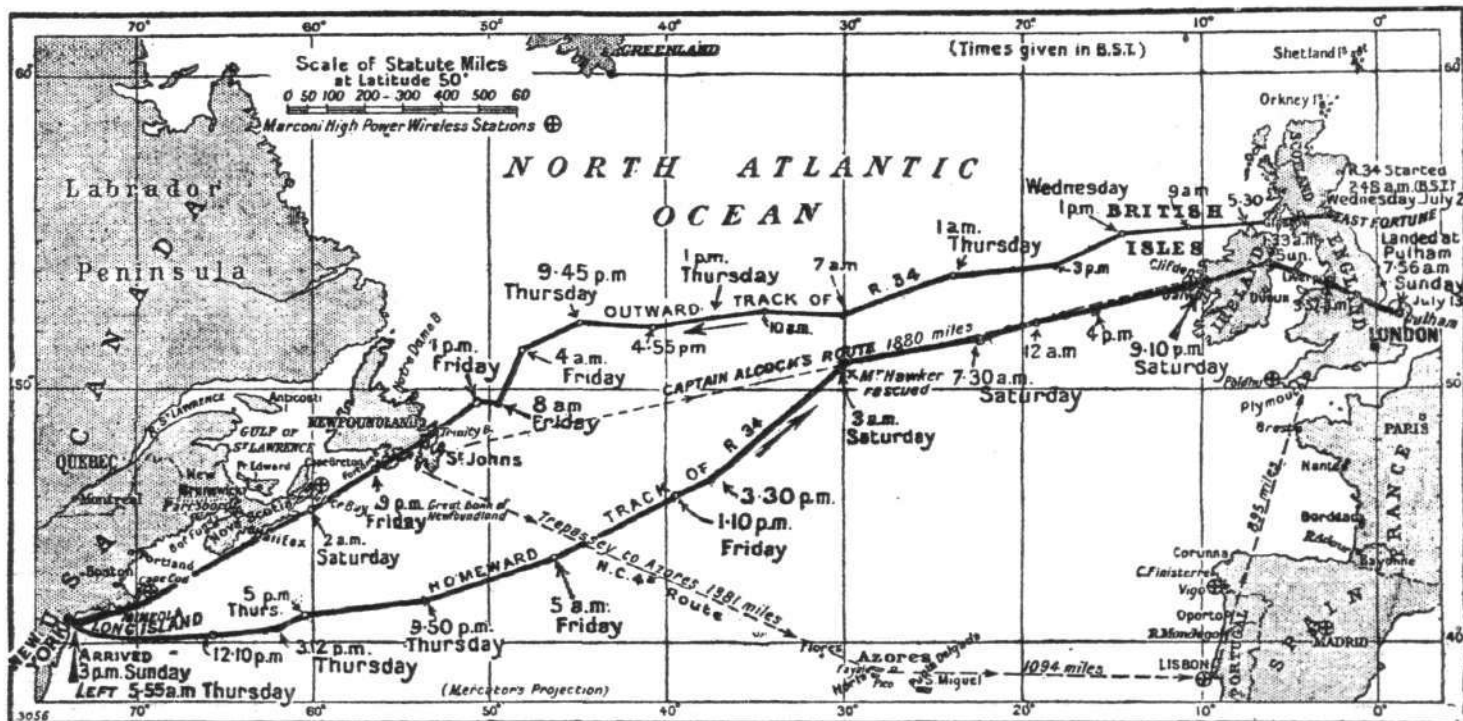
importance of aerial advertisement. From 2,000 ft. above we see its wheel revolving and the mist rising in a cloud behind it, presumably an illustration of its speed.

The air over New York feels very disturbed, partly owing to the approaching cyclone from the Great Lakes, of which we have already had warning, and partly also to the heat rising upwards from the city itself. The airship, however, rides out very steadily under the circumstances.

July 10, Thursday, 1.10 a.m.—We head for home with 3,000 miles of sea between us and our Scottish base. The wind is now well behind, and our speed makes good; it is estimated at 65 knots, or nearly 74 m.p.h. Our weather at time of starting is decidedly favourable for a flight from

America to England. There is a depression west of Newfoundland, and then a large one centred to the north of Iceland; also an anti-cyclone over the East Atlantic and Great Britain. The inference from the above is that a strong south-west or west wind will prevail over the greater part of the Atlantic. We have got away on the outskirts of the depression which is central west of Newfoundland, and are getting the full benefit of the 35-knot south-west wind on its southerly side.

At this speed we are travelling considerably faster than the depression, which is probably moving eastward at about 35 m.p.h., and it may well be that we shall run right out of it by the time we reach mid-Atlantic. We then expect



R 34'S RETURN FROM AMERICA: Map from *The Times* showing the route taken on the homeward journey. The outward and homeward courses of the R 34 are shown above, the times indicated on the chart being British summer time throughout. It will be noted that until 1.30 a.m. on Sunday morning the R 34 was heading for East Fortune, whither the crew were anxious to return.

(it may be only a pious hope) to get into touch with the still bigger depression centred to the north of Iceland and benefit by the south-west wind which we ought to find on its southerly side.

2.17 a.m.—We are crossing the American coast with four out of our five engines running, the fifth engine resting. Some hot coffee from the Thermos flask presented us by our kind American friends is very nice and warming.

9.15 a.m.—We have already covered 430 miles from New York and are going strong. Our mails are now sorted and this takes some time. We find we have quite a large collection of parcels and letters of all descriptions, including some for H.M. the King, the Foreign Office, Admiralty, Postmaster-General, and a large number of copies of the *Public Ledger* for the Editor of *The Times*. This journey, we hope, will prove the fastest newspaper delivery between New York and London yet accomplished, and will be the forerunner of regular interchanges of mails between East and West—the Old World and the New.

10.45 a.m. G.M.T.—We are now making good 72 knots, or 83 m.p.h., on four engines. The forward engine stopped. If all goes well Maj. Scott will go straight for London, and we will see how long it takes us to cross the Atlantic from Broadway, New York, to Piccadilly Circus, London—from the heart of one capital to the heart of the other.

10.45 a.m.—Cooke asleep under the dining-room table. (Note.—This may take our thoughts back to the days of our ancestors, but the cause of this slip and the position selected are from quite a different reason.)

12 noon.—Lunch: Cold Bologna sausage and pickles and stewed pineapple, and a ration of rum. This latter was much appreciated as the weather had turned much colder. The conversation turned on the subject of obtaining secondary meteorological information in the Atlantic. Scott, Greenland, Luck and Harris all agree that one good method of getting information at small cost would be to equip all cable repair ships with a meteorological observer and a suitable outfit of kites and instruments. These cable repair ships work in all parts of the world, and are often at sea for days at a time. Moreover, the cable routes are ready in every case on the shortest and most direct route between the countries they link up.

1.5 p.m.—We have averaged 56.3 knots ever since leaving

Broadway. Weather fine, visibility 15.20 miles. Wind 40 knots S.S.W., sea very rough. It is difficult from above to measure the height of the waves, but it is easy to see that in a very heavy sea like this one surface ships would be having an extremely bad time. Up here we are as steady as a rock, and unless one looks out of the windows one would hardly realise we were travelling at all.

Lieut.-Col. Hemsley, U.S. Army Aviation Department, is steering, and is taking opposite watch with Pritchard, while Luck has relieved Greenland in the fore car, Corpl. Burgess being on the elevators. We are in very good wireless communication with Sable Island, and many messages wishing us success are received from America and Canada. We send our grateful thanks to the U.S. naval and military authorities for their very efficient and kind assistance in looking after the airship at Mineola during four days of difficult and unpleasant weather conditions.

4.50 p.m.—Position 42.15 N., 54.05 W.; course 140 deg. steered, 110 deg. made good, 86 deg. true, 48 knots. We have covered 900 miles from New York, 16 hours, and are 1,850 miles from south coast of Ireland, exactly one-third of the distance between the two countries.

Our petrol consumption works out at about one gallon an hour. Weather clear, sea deep blue, very good visibility, 35-40 miles according to the dip and distance horizon tables at this height (1,500 ft.), should be 45 miles. Cooke determined his position by observation on the sun and sea horizon. It is interesting to note that there were only two occasions when he was able to do this on the outward journey owing to clouds and fog.

6.15 p.m.—A five-masted schooner under full sail on starboard beam about five miles away was an interesting contrast between the old and the new, the sailing ship and the airship. We are now over the main east-bound summer route of steamers from New York to Queenstown. The s.s. *Adriatic*, due New York on 13th, should be somewhere near us, and we are on the look-out for her on the wireless. Getting much colder.

8 p.m.—Position 42.40 N., 50.30 W., making good 55 knots. Harris gives most interesting explanation of the clouds formation to the N. and S. of us, and compares the clouds as we see them with the illustrations in a different cloud text-book we have with us. It is now time for supper,



R 34'S ARRIVAL AT MINEOLA: A photograph taken from an American Blimp sent out to welcome R 34, which is seen making its way to the landing-ground at Roosevelt Field.

soft-boiled eggs and cocoa, and we all discussed at great length our impressions of American men and American women. I wish our newly-made American friends could have heard the delightful things that were said about them. Pritchard goes to sleep under the dining-room table, while the second watch come in for their supper. This position under the dining-room table seems to be the most sought-after point of vantage in the ship.

July 11, Friday, 3.20 a.m.—Position 45.03 N., 42.57 W., estimated by observations on stars and sea horizon. Visibility good.

4.20 a.m.—The foremost of the two engines in aft car breaks down on connecting-rod fractures owing to bolts shearing, with the result that the crank-case gets badly notched and the engine is consequently quite beyond repair. Course, making good 115 deg. or 87 deg. true. At 26 knots with forward and two wing engines. Weather clear, sea moderate.

6.40 a.m.—Altered course to N. 30 deg. E., came down to 600 ft. to get under clouds, which are now appearing and threaten to block out all view of the sea completely. We now find by accurate measurements that below the clouds is a northerly wind and above them, at 3,000 ft., the wind is from south-west. The reason for this is an interesting one. We are over the Gulf Stream on a north-easterly course. The air over this Gulf Stream is warmer than the air over the sea immediately to the north of it. This warm air rises and its place is naturally taken by the cold air from the north, resulting in a 12-knot convectional wind from the north extending from the surface of the sea up to a height of about 2,000 ft. Having made this discovery, we accordingly keep at 3,000 ft., when we have a steady wind from south-west.

8 a.m.—Cloud formations in so far as they indicate weather are like an open book, profusely illustrated, with a plot that changes all the time. On our port beam away to the north-west we see the depression centred over Newfoundland written plainly in the sky in fantastic and streaky cirrus ventosus, a certain and sure indication of what is going on over there some hundreds of miles away.

9.15 a.m.—Clocks have now been put forward one hour.

10.30 a.m.—Scott and Harris are agreed that the wind is stronger in our favour the higher we go up, but in spite of that Scott decides to keep on a 3,000 ft. level to avoid necessity of losing gas from expansion, which to-day is precious. Tomorrow he can afford to go much higher, and the airship will be so much lighter on account of having burned another 24 hours' petrol.

12 noon.—Weather report from Air Ministry tells us of an anti-cyclone off south-west of Ireland, and so we change course more to the north with a view to getting round into the westerly wind which we know must be blowing on the northerly side of it.

12.30 p.m.—Lunch. Mealtimes are always most welcome, and give the more responsible members of the crew a much-needed interval. Our new gramophone is a vitally better instrument than the one we endured on the outward voyage,

and as I was descending the ladder down into the fore car after lunch I just caught a glimpse of Luck and Harris doing quite a nice one-step together.

1.30 p.m.—Air Ministry sent a message to say that they had made provision to land us in Ireland if necessary, and that destroyers with steam up were available at Berehaven if required. We replied—propose to land at East Fortune. One engine completely broken down.

3.30 p.m.—Still at 3,000 ft. in and out of the clouds at intervals. We have not seen the sea since 8.30 this morning, 1,600 revs. three engines, our speed 32 knots. Another weather report from London to say that the depression north of Iceland has moved easterly, and that as a result the wind is from south-west over north of Ireland and whole of Scotland. This strengthens Scott in his decision to give up going to London and go to East Fortune instead. It is sad not to take in London on our return, but with one engine lost and weather in South of England not very favourable the decision is a wise one.

4.30 p.m.—Scott brings ship down to try to see water and get an indication of our speed, but at 900 ft. it is still very thick, so he abandons the attempt. In coming down from 3,800 ft. to 900 ft. we pass through no fewer than five distinct and separate cloud strata. In these thick clouds (we have been in them now since 3.30 this morning) we have no means of telling our speed, as they extend right down to the water. We assume from general weather observations that the wind is with us, the worst condition we think fair to assume being no wind at all. There certainly ought not to be a head wind against us. There is no alternative but to keep pegging away through the clouds until other weather conditions appear.

4.45 p.m.—We appear above the clouds for a few blissful moments and see a beautiful cloud panorama. Range upon range of alternate white and slate-coloured mountains with wide deep valleys and an occasional glimpse of bright blue sky immediately above. The glare is almost blinding, and we can only look at the sun for a moment or two at a time.

5 p.m.—We are back again in the clouds with no visibility. Picked up H.M.S. *Cumberland* on our Marconi spark set. She gave her position and when plotted on the chart Cooke thinks her to be almost due north of us, and from the strength of her signal she should be within 30 miles. Durrant tried to get her with our directional wireless, but without success.

7.5 p.m.—Passing through wet rain clouds. It has been raining very heavily since 5 o'clock. Scott goes up to 5,000 ft. to get out of it, but with no success, and reduces height to 3,000 ft. again. Very cold and dark. All windows and doors are shut.

7.35 p.m.—We ask H.M.S. *Cumberland* for a weather report. She replies giving her position and reporting wind at N.N.W., 18 m.p.h., overcast, passing showers, and clouds above 1,000 ft.

8 p.m.—Supper, and a very good one too. We are well equipped with little luxuries on this return voyage, having learnt a thing or two on the outward journey, about what is necessary and what is not.



R 34's ATLANTIC CROSSING: The British dirigible at anchor on the Mineola landing-ground.

8.30 p.m.—Still pouring with rain. Height 4,000 ft. The wind whistles round the forward car. Very dark and no visibility. Scott reduces height to 3,000 ft., and an extraordinary sight suddenly presents itself beneath us. Thousands and thousands of little round clouds like tiny white puff balls packed closely together, with the blue sea just visible in between them, form a layer of cloud between us and the sea. This cloud formation is called "ball cumulus."

8.45 p.m.—Dropped a calcium flare, which floated away burning brightly straight astern and enabling Cooke to get our direction and a good idea of the speed at which we were travelling.

8.50 p.m.—Again thick clouds and heavy rain. Clifden Wireless Station sounds very loud on the wireless, which shows we are getting nearer home, and Durrant has just succeeded in getting East Fortune, 1,100 miles away. He could just faintly hear them say the words "Saturday evening."

9.15 p.m.—S.S. *Dominion* speaks us and gives her position and barometric readings. She reports us as being quite near her, though, of course, she cannot see us or even hear our engines owing to rain clouds.

12 midnight.—Still pouring with rain. Dropped flare; drift estimated as 10 deg. to southward. As we lay in our hammocks we listened to the rain beating pitilessly down on the outer cover of our trusty ship of the air, and our feelings, despite the weather, are those of complete confidence and security.

July 12, Saturday, 12.45 a.m.—Weather clearing. Sea visible at 2,500 ft.

3 a.m.—Magnificent sunrise. The sun appeared above the clouds in a blaze of colour, much impressing those of the crew who happened to be on duty at the time.

6 a.m.—Position 52.20 N., 22.35 W., 760 miles from East Fortune. Running on three engines, aft engine having broken valves. Springs changed. Air speed 32 knots. It is interesting to note that Cooke has not been able to get a single observation for plotting his position for the last 24 hours, and it is quite fair to assume that yesterday's weather with S.W. wind is quite an average day in mid-Atlantic. Clouds beneath us look just like a gigantic soft, springy,

fleecy, white feather bed, and they fill one with a strange irresistible feeling of wishing to jump down into them, probably a similar sort of feeling which some people feel when they are climbing a steep mountain face.

8 a.m.—H.M.S. *Tiger* gives her position and reports wind N.W.—N. 15-20 m.p.h., sky overcast with low stratus, visibility five miles. Breakfast this morning is quite a festive meal, as we reckoned it should be our last breakfast on board, and we are not quite so economical with our issues as usual. Message received from Mr. G. Constantinesco, the brilliant Roumanian inventor of Sonic transmission, welcoming us back to England.

10.55 a.m.—Height 5,000 ft. We are now over a big gap in the clouds about 26 miles across, and will soon be in the clouds again. Clear blue sky and sea. No sign of a ship. Making good 35 knots, which should enable us to make East Fortune at daybreak to-morrow.

11.25 a.m.—Durrant succeeds in getting a wireless out on Clifden with directional finding apparatus. Weather has turned very cold.

12 noon.—Lunch. We are all rather anxious to get to our journey's end. Perhaps it is the strain that is beginning to tell, and it is now rather disappointing to find that a N.E. wind is preventing us from making more than 28 knots. We shall be breakfasting in the air again to-morrow, after all.

12.30 p.m.—The clouds have all cleared away, but only temporarily, I feel certain. Height 5,000 ft., perfectly clear blue sky and deep blue sea. Visibility is at its maximum, and at this height, according to our text-books, we can see 81 miles. This means that we can see 162 miles from right forward to right aft, and the area we can see over works out at 19,200 square miles, and not a ship to be seen. My ambition to see a steamer at close quarters in this gigantic Atlantic will, I am afraid, never be realised.

3.50 p.m.—Clouds rolling up again. Some very fine examples of cumulus major are to be seen. One particularly interesting cloud formation on our port beam takes the eye. It is a huge vertical column of cloud joining a lower stratus of cloud to a higher stratus, and is about 500 ft. high. It is carried by an upturned vertical current.

5.30 p.m.—Great excitement. Two trawlers are sighted on our starboard beam. They look very tiny. We try to speak the near one with an Aldis lamp, but as she has no wireless we cannot get reply. We are now down to 3,000 ft., and the difference in temperature between this height and 5,000 ft. is most marked, 8 deg. F. Making slightly better headway at this height, 32 knots. Wind N.N.W., 25 deg. drift. Cooke considers that an accuracy of more than 20 miles in estimating a position in mid-Atlantic cannot be guaranteed in an airship even in clear weather. Directional wireless, however, should, when perfected, make this much more accurate.

6.50 p.m.—We ran into a sudden squall from north-west. Low black clouds and a rough confused sea all in a space of a few minutes. Ship very steady. 1,600 revolutions on four engines.

6.57 p.m.—Passed out of squall. Got Clifden on directional wireless. 96 deg. mag. 76 true. We are not very far from the coast of Ireland.

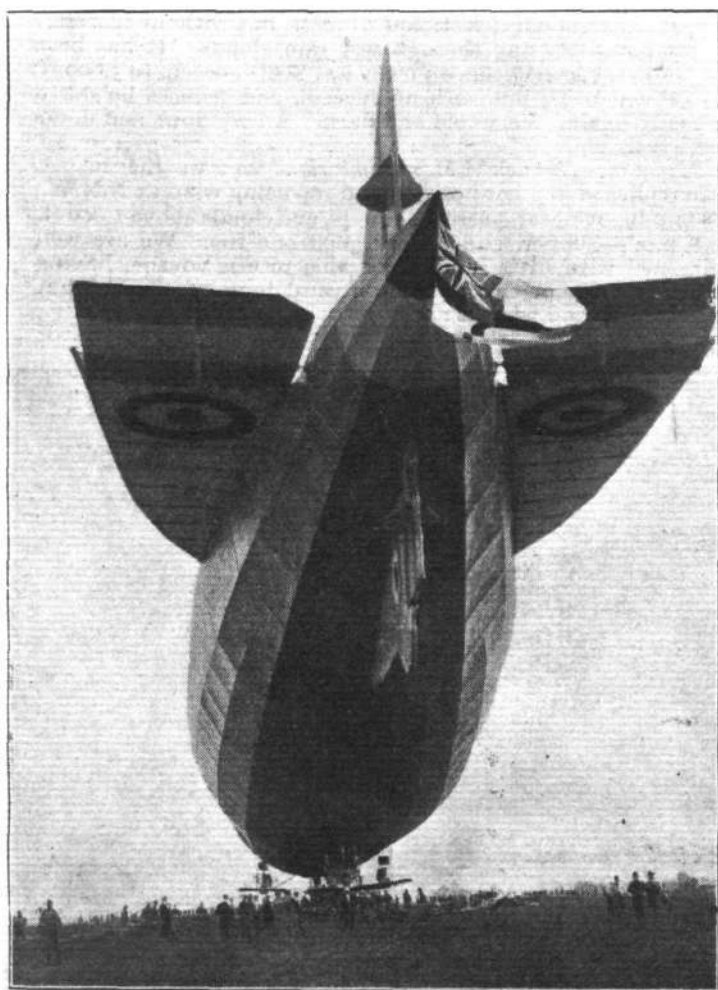
7.15 p.m.—Another squall, but not a big one.

Land in Sight

7.25 p.m.—Land in sight on our starboard bow. Great enthusiasm on board. First spotted by Lieut.-Col. Hemsley, U.S. Army Aviation Department, 7-10 miles away. Scott alters course to make the land. Cooke gets the large chart of the west coast of Ireland, and there is keen competition to see who will fix on the exact spot when we cross the coast. Two little islands lie right ahead of us. With our glasses we see the wireless mast of Clifden. These two islands are almost certainly the same two little islands that appeared out of the fog to the delighted gaze of Alcock and Brown at the conclusion of their historical flight. A strange and happy coincidence.

8 p.m.—At 8 o'clock precisely we crossed the coast line a little to the north of Clifden, Co. Mayo, and our time from crossing the American coast at Long Island to crossing the Irish coast is exactly 61 hours 33 minutes.

8.15 p.m.—We head right in over the mountains, which at this spot are 2,900 ft. high. What a wild and rugged coast line! A magnificent cloud panorama now appears. Huge white cumulus clouds of weird and fantastic shape surround us on all sides, and over the top peep out the tops of the mountains, while through the gaps we see lakes, harbours, islands, and green fields, quite the prettiest picture we have seen on the entire voyage. It seems as if the elements have reserved their best cloud shapes to welcome us as we cross over British soil.



R 34 IN AMERICA: A striking view from beneath of the airship at Roosevelt Field. Note the gas cylinders for re-filling.

9.10 p.m.—Two-seater aeroplane from neighbourhood of Castlebar flying past us and under us, waving a welcome. We are now well away from the mountains over the flat country inland, heading right across to Belfast and finally East Fortune. Height 2,000 ft., making good 38 knots. Bright full moon.

The Airship's Company

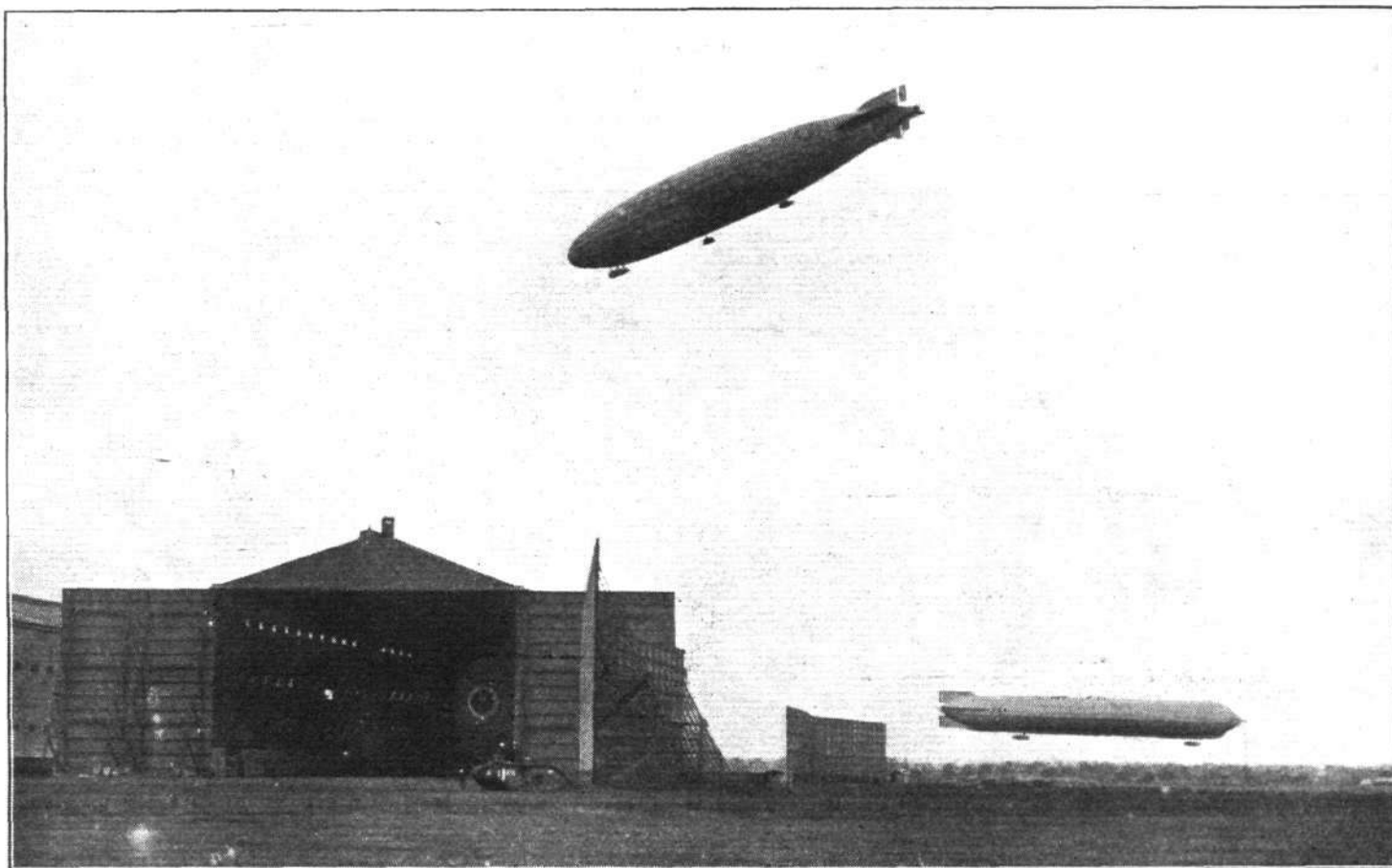
Crew of the R 34 on return journey:—Officers:—Maj. G. H. Scott, A.F.C., Capt. G. S. Greenland, 1st officer, Sec. Lieut. H. F. Luck, 2nd officer, and Lieut. J. D. Shotter, engineer officer (Ship's Officers); also Brig.-Gen. E. F. Maitland, C.M.G., D.S.O., representing Air Ministry; Maj. J. E. M. Pritchard, O.B.E., Admiralty; Lieut.-Col. W. H. Hemsley, United States Aviation Army Department; Maj. G. G. H. Cooke, D.S.C., navigating officer; Lieut. Guy Harris, meteorological officer; Sec. Lieut. R. D. Durrant,

assume there is some special reason and we alter our course accordingly.

Sunday, July 13, 7 a.m.—Scott increases height to 5,000 ft., and course is steered over Isle of Man, and Liverpool 2.45 a.m., Derby 3.55 a.m., and Nottingham 4.15 a.m., direct to Pulham.

5 a.m.—A wireless message is received from His Majesty the King:—"I congratulate you all on your safe return after completion of your memorable and, indeed, unique Transatlantic voyage.—Signed, G.R." Wireless messages of congratulations were also received from Maj.-Gen. Seely, Under-Secretary of State for Air; Maj.-Gen. Sir H.M. Trenchard, Chief of Air Staff; Maj.-Gen. Sir F. H. Sykes, Controller-General of Civil Aviation; and Sir A. Robinson, Secretary of the Air Council.

6.20 a.m.—Over Pulham Airship Station, and 6.57 landed.



R 34 HOME AGAIN AT PULHAM, NORFOLK : In the air, R 34 descending to enter its hangar ; R 33 in the shed, and, on the right, tethered to the steel anchoring mast, R 24.

wireless officer; W. Mayes, coxswain; H. J. Robinson Flight-Sergt., coxswain; H. M. Watson, Sergt.; R. T. Burgess, Corpl.; F. Smith, Corpl.; J. Forneath, leading aircraftsman, F. Borowdie, air-mech. 1st Grade (last five riggers).

Engineers:—W. R. Gent, Flight-Sergt.; R. Ripley Flight-Sergt.; N. A. Scull, Flight-Sergt.; J. Shirwell, Sergt. B. Evenden, Sergt.; P. Cross, Corpl.; G. Gray, Corpl. G. Graham, 1st Air-Mech.; F. Mort, 1st Air-Mech.; J. Northeast, 1st Air-Mech.; R. Parker, 1st Air-Mech.; E. E. Turner, Flight-Sergt.; W. Angers, Flight-Sergt.; H. Powell, wireless Corpl.

The Last Stage

As things have turned out (though one could have foreseen this) it would have been wiser if we had kept a more northerly course after getting away from the helpful influence of the Newfoundland depression. We would then have been helped by this N.N.W. wind instead of being hindered by it and might have saved some time. Undoubtedly the captains of the big aerial liners of the future will become wily and cunning masters of the art of selecting the right way and the right height and often by making wide *detours* will by means of their air knowledge alone save many hours on long sea and land passages.

11.20 p.m.—Message from Air Ministry to say we are to land at Pulham. We ask if we may land at East Fortune as that is our original objective and the weather is reported good for landing. The reply is to land at Pulham, so we

Total time of return journey from Long Island to Pulham, Norfolk, 75 hours, 3 minutes, or three days, three hours, three minutes.

General Maitland's Story

In an interview with Mr. H. C. Bailey, of the *Daily Telegraph*, Gen. Maitland gave some further impressions:—

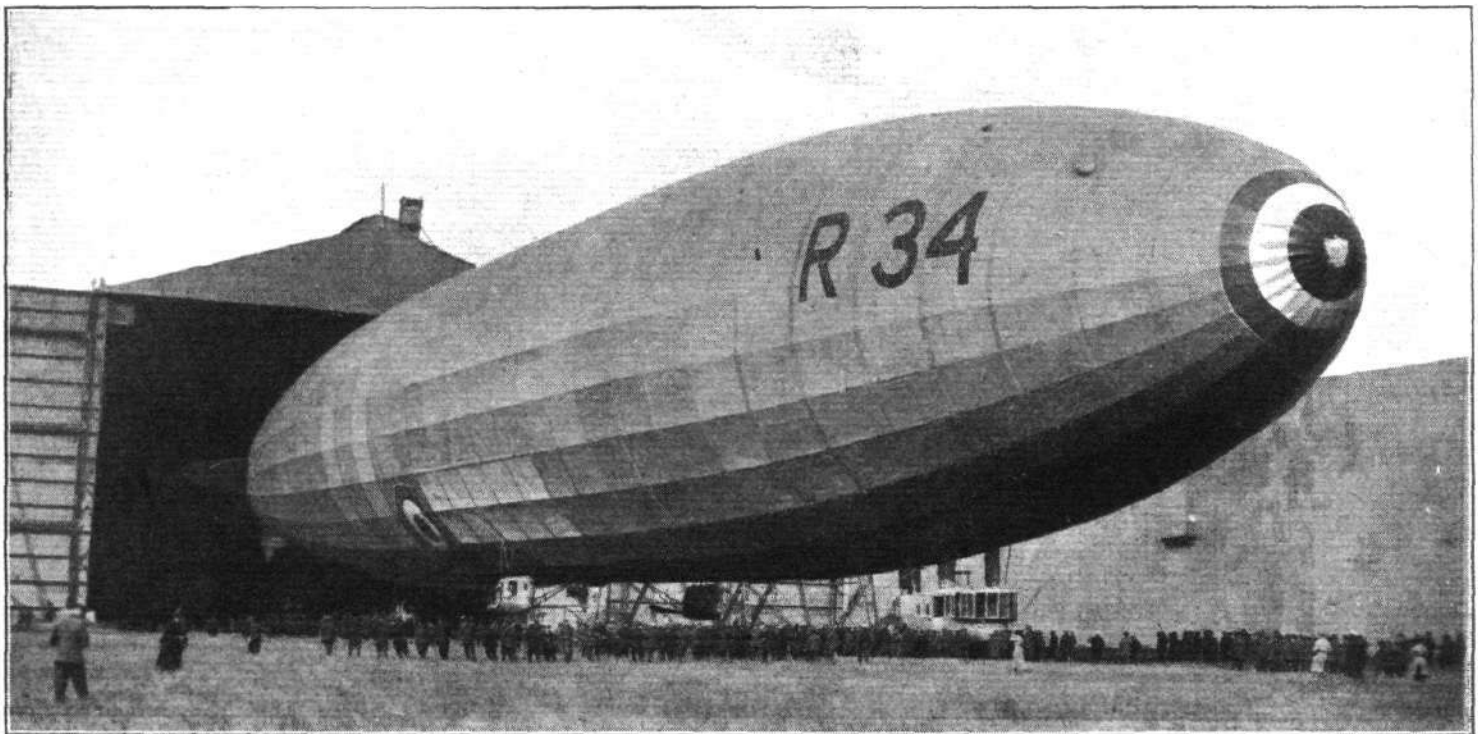
"One of the objects of the flight," he said, "was to demonstrate what airships could do in long-distance flying over sea with an ultimate view to their commercial use. Airships will undoubtedly be employed for commercial purposes for very long journeys over sea and land. They will not conflict with the aeroplane and seaplane. There is no question of competition. Airships will make long voyages, and from their termini aeroplanes and seaplanes will radiate on short, quick journeys. A second object of the voyage was to cement the friendship between this country and the United States. The 'R.34' was very comfortable. There was no feeling of sea-sickness on board. On the return trip we had a wind of 45 miles an hour and a high sea. A surface ship would have been all over the place. The airship's motion was perfectly smooth.

"We came to Pulham not because we should have had any difficulty in making East Fortune, but because we were ordered here by the Air Ministry. The landing in America gave an illustration of the uses of the parachute in air work. When the 'R.34' was over the landing-ground on Long Island,

Maj. Pritchard went down by parachute from a height of 1,500 ft. to assist in directing the landing party, and his services were very useful. This illustrates the employment of the parachute in air work in addition to its value in life saving. The parachute, I am convinced, will be used in all air craft, but will be of particular value to the airship.

"The worst moment of the voyage? I think our worst moment was on the outward run, when we met the electric storm in the Bay of Fundy. Confident? Oh, yes, we were all confident that we should complete the round trip. The only question was whether the petrol would last out. It is certainly true that after a long flight landing is difficult, because an airship with its petrol expended is very light. We have begun experiments in mooring ships in the open. You can see the first experiment here, 'R.24' (this is an earlier and smaller craft) "is lying moored to a mast, and she has been out since Thursday. In the future I hope that an airship will come in under her own power right over her mooring-mast, drop a cable, which will be connected by one or two men to a cable in the mast, and will then be hauled down by a winch till her bows meet the tip of the mast. Such a mast for a big airship would be some 200 ft. high. It would be a structure of some considerable diameter, a tower, let us

destination the engine in the stern car broke down beyond repair. Fortunately, no one was hurt. Thus, as we carry five engines, the ship lost one-fifth of her power. In the conditions of the voyage it made no practical difference. I seldom have all the engines working, and, in fact, only use the whole five when running against a strong wind. Before making Ireland we were for six hours at over 5,000 ft. We reached the coast just by Clifden wireless station, in fact, at just the same point as Alcock. We approached Pulham by way of Derby, Nottingham, and King's Lynn. The signal which you saw the ship making as she approached the station was to ask for the barometrical reading on the ground in order that I might judge how to make the descent. The water which was discharged from the bows as we came down was let out to render the descent more gradual. We started out from America with 4,900 gallons of petrol. We landed at Pulham with 1,000 gallons still on board, so that the run was made on 3,900. On landing we received a message from the King. I think that there is no room for doubt that the large airship is the type of aircraft for deep sea work. Before very long I hope that we shall have airships of a size and speed which will enable them to sustain a rate of 70-80 miles an hour. The cross-Atlantic route, I think, will vary with the weather.



R 34 entering the hangar at Pulham on Sunday, July 13, after her successful return journey from America.

say, and the airship's passengers would disembark by coming down inside it in a lift.

"Our damages? Oh, the damage on the landing in America was very slight, and easily repaired. In the engine which failed coming home, the connecting-rod broke, and the engine was completely wrecked."

Maj. Scott's Impressions

Maj. Scott, the Commander of the "R.34," also gave some impressions to Mr. Bailey:—

"It was an uneventful voyage," said Maj. Scott. "I estimated that it would take between 70 and 80 hours. In fact, it took 75 hours 3 min. The outward voyage lasted 108 hours. On leaving Long Island we proceeded to New York, and were over the city between midnight and 1 a.m. We circled over Broadway at a height of 2,000 ft., but we could not hear the crowds cheering on account of the noise of our own engines. Owing to the storm behind us, and the strong following wind which it caused, the first 500 miles were made at a very high speed. Our best rate was 72 knots—some 80 miles an hour. After leaving Newfoundland, which we passed on a course 150 miles to the south, the following wind failed, and we had a certain amount of head wind, which yielded to light and various breezes. We met much low cloud and fog, and could take no sight of any sort for 24 hours. Directional wireless enabled us to keep our course without difficulty. When we were still some 1,200 miles away from our

There can hardly be for aircraft, as for surface ships, more or less fixed courses."

R 34's Engineer Officer

Probably no one on the airship would deny that the hardest work of all fell to the lot of Lieut. John Irwin Denham Shotter, engineer officer of the R 34. He was responsible for the care of the five Sunbeams, and, in fact, for everything of an engineering nature on the airship. He, like everyone else on board, depended upon Maj. Scott, but everyone in turn depended equally on him, for the upkeep and skilful management of the motors were vital to the success of the voyage, and as all the world knows by now, his post demanded the most constant attention.

His task was made all the harder, and his heroism was all the greater, for the reason, known to all his comrades, that on the eve of the start his wife was taken seriously ill with heart trouble. Under such circumstances he might well have been forgiven if he had asked to be relieved of his duty, but his heart was in the work for which he had trained so long, and no one else knew the ship and her engines as he did, so he went through with it, despite the keenest personal anxiety for the safety of his wife. Under such mental strain his devotion to duty deserves the highest praise.

Lieut. Shotter, who was born on November 7, 1890, at Freshwater, Isle of Wight, was by a curious coincidence born in a house which was the property of Gen. Sir J. B.

Seely, with whom his father had served in the South African War, and had also manned the same lifeboat on numerous occasions. This fact aroused much interest at the House of Commons luncheon at which Gen. Sir J. B. Seely presided on Monday. Our Allies will be glad to know that his mother is French.

He served his apprenticeship to locomotive engineering at Messrs. Manning and Wardle's, at Leeds, but soon turned his attention to internal combustion engines, and at the outbreak of War was chief aero engine tester at the Wolseley works at Birmingham. He joined the Royal Naval Air Service as a petty officer on his birthday in 1914, having set himself out to see how far he could progress on his merits. His career was one of steady rise, and he gained valuable experience on every type of airship. His enthusiasm suffered in no way in spite of the fact that his first trip ended in disaster and a period in hospital. For his bravery on that occasion he was specially mentioned in despatches and promoted to rigids.

He has achieved a reputation of the highest class for his handling of aeromotors on rigid airships, and has spent in all over 2,000 hours flying. The official logs of the several great and historic journeys of the R 34 give some idea of his capabilities under circumstances of extreme difficulty, where the economical use of his fuel and the hourly nursing of each motor meant all the difference between success and disaster. As illustrative of his coolness, one of his brother officers relates how Shotter was roughly disturbed in the midst of a brief spell of sleep by a mechanic who exclaimed, "My engine's all on fire!" Shotter, exhausted by his labours, calmly replied, "Well, go and put it out!"

He received the most gratifying compliments from prominent officers in the American Air Service, among them Commander Reade of the N.C. 4, and was embarrassed by the fame he had earned. No engineer officer in any Air Service ever had so gruelling a test before, and few would have emerged with such honour.

Congratulations

The following message of congratulation from the King was despatched by wireless, and was received by R 34 while on her way from Nottingham to Pulham:—

"I heartily congratulate you all on your safe return home after the completion of your memorable and, indeed, unique Transatlantic air voyage.—GEORGE, R. and I."

The Air Minister has communicated the following congratulatory message received from the Prime Minister to Gen. Maitland, Maj. Scott, and the crew of H.M.A. R 34:—"Heartiest congratulations on fine feat of airmanship.—Lloyd George."

From Mr. Churchill, Secretary of State for Air, to Gen. Maitland and officer commanding R 34:—"My sincere congratulations to all concerned on the complete accomplishment of your journey and your successful work as pioneers."

From Maj.-Gen. Seely, Under-Secretary of State for Air:—"I send my best congratulations to you and to the crew of R 34 on your magnificent achievement of being the first to cross and re-cross the Atlantic by air. We are all very proud of you."

From the Secretary, Air Council:—"Heartiest congratulations on making the return journey so successfully. The Air Council fully realise the endurance and fortitude entailed in the accomplishment of this epoch-making event.—W. A. ROBINSON, Secretary, Air Council."

From the Controller-General, Civil Aviation:—"Heartiest congratulations from myself and Department of Civil Aviation on your successful journey and safe return. It is a really splendid augury for the future of commercial aviation.—SYKES."

From the Chief of the Air Staff:—"On behalf of the whole Air Force, I send you heartiest congratulations on your magnificent achievement in making the double journey across the Atlantic.—TRENCHARD, Chief of Air Staff."

In a further personal telegram to Gen. Maitland and Maj. Scott, Gen. Trenchard said:—"Please accept my heartiest congratulations on your successful accomplishment of the return journey. The flight you have just completed is, I consider, one of the main stepping-stones in long-distance aviation."

ITEMS

On her outward journey the R 34 carried a message from Mr. Long, the First Lord of the Admiralty, to Mr. Daniels, the United States Secretary for the Navy. She brought back a reply in which Mr. Daniels says: "Our country is filled with pleasure at the successful arrival of the R 34. The Navy of America salutes the British Admiralty. It is our privilege to live in the days of fulfilment of many

visions and dreams. I congratulate your great Empire on its spirit of daring and skill which is evident in this epoch-making flight."

The Governor-General of Canada received the following message from King George by the R 34:—

"I take this opportunity of sending by the first British airship to cross the Atlantic a message of good wishes to the people of Canada from the Old Country."

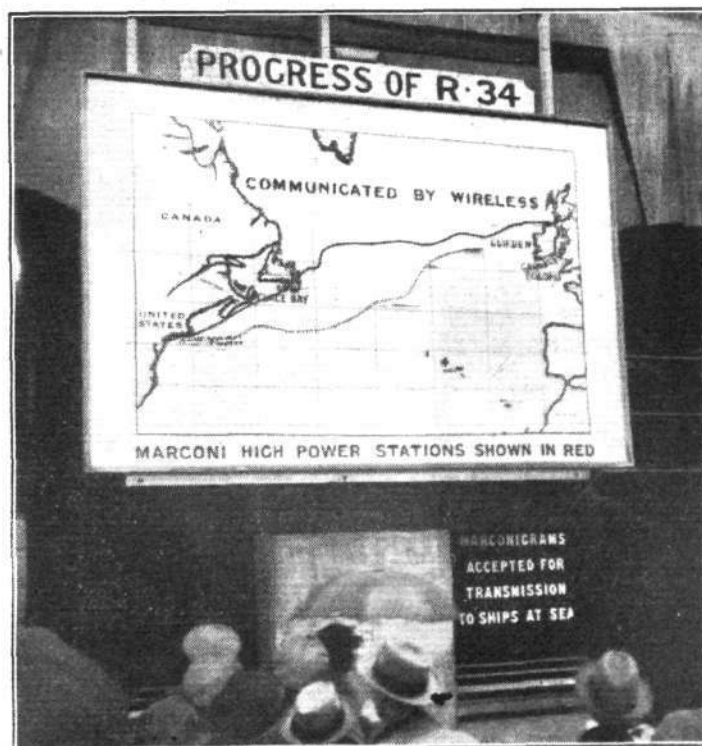
The following telegrams have been received by the Under-Secretary of State for Air, Gen. the Rt. Hon. J. B. Seely, in reply to messages sent by him on the R 34, which were dropped by Gen. Maitland when passing over Canadian territory and over Newfoundland. The Canadian Premier, Sir Robert Borden, telegraphs:—"Best thanks for your greetings. Warmest congratulations on splendid success of R 34. I earnestly join you in your aspiration that this successful endeavour may tend to bring closer together all the great English-speaking nations."

The Premier of Newfoundland replies:—"Thanks for your message dropped by dirigible last Friday. It was blown away from parachute and only recovered yestereve. On behalf of colleagues and country please accept warmest congratulations from Newfoundland on success of dirigible flight which forms yet another aviation triumph for the Briton."

Among the 40 lb. of mail brought back were the two gold medals awarded by the Aero Club of America to Capt. Sir John Alcock and Lieut. Sir W. Brown.

Sergts. Turner and Anders replaced the wireless operator Edwards and the stowaway Ballantyne in the crew of the R 34 on the return flight.

Gen. Maitland, Maj. Scott, and Lieut. Shotter arrived in London on Monday morning, and were met at Liverpool Street Station by representatives of the Air Ministry. Mrs. Winston Churchill was there with Lady Drogheda, and the War Minister was represented by Col. Scott. Gen. Swinton represented Gen. Sykes (Controller-General of Civil Aviation), Col. Chamier represented Gen. Trenchard (Chief of Air Staff), and amongst others on the platform were Gen. Masterman (chief representative of the Airship Service), Comdr. Perrin (secretary of the Royal Aero Club), Comdr. Ramsey (of the United States Navy), and a number of R.A.F. officers who were connected with the arrangements for the flight. The three officers were entertained at luncheon in the House of Commons by Gen. Seely, Gen. Trenchard, and Gen. Sykes.



R 34'S RETURN FROM AMERICA: The Progress Board erected at Marconi House in the Strand giving the position of the British airship regularly, from the wireless messages as received.

Included in the cargo landed by the R 34 on Sunday morning was a film showing the airship's arrival in America and scenes at Mineola up to the time of her departure. The pictures were taken by Messrs. Pathe's operator, and were brought home in the airship by permission of the Air Council, enabling events which took place over 3,000 miles away to be depicted on the screen in England within four days.

Some remarkable wireless signals were exchanged during the voyage of the R 34. The Royal Air Force station at Dundee exchanged signals at 1,000 miles. The R 34 sent messages at 1,100 miles that were read by the Air Ministry and by Wormwood Scrubbs at 1,135 miles, and by Ballybunion at 1,600. In one case, when the R 34 was approaching America, a signal was sent to her from the Air Ministry through Clifden, and a reply received via St. John's, Glace Bay, Clifden, and Marconi House, and then to the Air Ministry, all in 20 minutes.

Dunbar will confer the freedom of the burgh on Maj. Scott, commander of the R 34.

The R 34 brought over a batch of United States papers, among them being parcels of the *Philadelphia Public Ledger*

and the *New York Times*. The London correspondent of the latter states that a copy of the *New York Times* of July 9 was received by the King at Buckingham Palace on Sunday soon after 1 p.m., while a copy of the *Public Ledger* was delivered at the Palace at 2.30 p.m.

The damage to the envelope of the R 34 is just in front of the forward gondola, and was caused in an accident to the mooring eyes that are fixed there. It was satisfactorily repaired for the voyage, but no doubt the damage will now be permanently repaired.

The Air Ministry have allowed visitors to inspect the airship each day between 2 and 8 p.m., and large numbers of people have taken advantage of this opportunity.

LEADING AIRCRAFTSMAN GEORGE GRAHAM received an offer in America of \$1,000 (£200) for "Wopsie," his tabby kitten, which sailed on "R.34." Graham, however, refused to part with it.

THE "establishment" of the R.34 included two carrier pigeons, but one escaped in America.

EMAILLITE DOPING SCHEMES FOR RIGID AIRSHIPS

EXCEPT those who have to do with the construction and maintenance of such great airships as the R 34, there are few people who realise the important part played by the doping of the envelope, yet it is a subject which has involved a very large amount of careful study and research on the part of those who have been called upon to supply the necessary materials. For many years the British Emaillite Co., Ltd., have specialised in the production of high-grade compositions for the protection of all aircraft coverings, and as a result of the lengthy experiments and tests carried out by their comprehensive technical staff, under the control of Dr. J. N. Goldsmith, Ph.D., M.Sc., F.I.C., it may be recalled that they originated a system of complete doping combinations for various purposes, and these proved so successful in practice that in 1916 the A.I.D. called upon the trade generally to provide complete doping schemes. This had the effect of materially assisting the technical control of all doping operations carried out at the aircraft factories, and the A.I.D. inspection of the same.

In view of this success, therefore, it is hardly to be wondered at that when, some three years ago, the question of proofing compositions for doping the outer covers of airships became urgent, the Admiralty and the A.I.D. should have sought the aid of the British Emaillite Co. Dr. Goldsmith, Mr. H. Bayley, the general manager of the British Emaillite Co., and the company's technical staff, at once concentrated upon the many problems involved, which were far more numerous than a superficial survey would indicate. It may be pointed out, for instance, that they were restricted to a total proofing weight of two grams per square metre, and that this protective covering had to withstand long exposure to the weather on the entire surface of the outer cover of vessels of such large superficial areas as the R 33 and R 34.

It is necessary to bear in mind, too, that the properties required for a doping combination for use on a rigid airship are utterly different from those generally understood in relation to the dope and dope coverings for the fabric surfaces of aeroplanes. Also the outer cover surfaces, while in position on the airship are required to remain in as uniform a tension as possible, yet the proofing has to be extremely pliable in

order to withstand the handling which the outer cover has to suffer in its preparation and fixing in position.

Nevertheless, this pliable proofing must be weather-proof and particularly, non-moisture absorbant. The tremendous surface exposed to the saturated atmosphere whilst in flight would, with an unsatisfactory proofing, entail the absorption of a great deal of moisture which by virtue of its weight would materially interfere with the speed of flying and lift of the ship.

The first Emaillite airship doping scheme was adopted by the Admiralty in November, 1916, but since then the subject has continued to receive extensive study, with the result that from time to time material improvements have been effected.

The scheme used on the R 33 and R 34 is that known as Airship Doping Scheme P, which, we understand, in its general properties is greatly superior to the best of the proofings employed on German airships. The fact that the R 34 was able to cross the Atlantic successfully in both directions under adverse atmospheric conditions very expressively indicates the extent to which the doping combination carried under Scheme P is resistant to atmospheric moisture. Even this scheme, however, has been considerably improved upon during the last few months, with the result that the new ships under construction schemes known as R and RA are being used.

Even now, however, the British Emaillite Co. are not resting on their laurels. They realise that there is no finality in the matter of proofing surfaces for such a purpose, and they are confident that the continuation of their work in this regard now going on and which will proceed in the future, will lead to yet a higher degree of efficiency, and to a relative extent, contribute towards the general commercial development of lighter-than-aircraft.

It is pleasing to be able to record that since the commencement of their investigations in 1916, the British Emaillite Co., Ltd., have received at the hands of the Admiralty officials responsible for airship production every kindly sympathy and encouragement, and the success of their labours has been greatly assisted by the valuable criticisms of the technical officials concerned with the question of the outer cover proofing.

Trial Trip of "R.32"

THE rigid airship "R.32," which has been built by Messrs. Short Bros. at Bedford, was taken out for a trial trip on July 7. The principal dimensions of this vessel are as follows: Length, 615 ft.; maximum diameter, 65 ft. 6 ins.; total capacity, 1,550,000 cub. ft.; total lift, 47 tons; disposable lift, 16.5 tons; ratio, disposable lift, plus 100 total lift, 35; total b.h.p., 1,500; endurance at two-thirds full power in sea miles, 2,200.

Disaster to the N.S. 11

It is with great regret that we have to record that the British non-rigid airship N.S. 11, which cruised over London a week or so ago, met with disaster in the early hours of Tuesday morning, while cruising off Morston, near Blakeney. She had left Pulham about midnight on Monday on mine-

sweeping patrol duty. Her crew consisted of two officers and five men. The cause of the disaster will probably never be known, but apparently about 1.15 a.m. during a thunderstorm, accompanied by lightning, the vessel caught fire, and the wreck fell to the sea. Some portions of the wreckage were salvaged by the Sheringham lifeboat. Last February the N.S. 11 made a record cruise of 101 hours.

Eighteen on a H.P. 1,500 ft. Up

TESTING one of a considerable number of machines which Messrs. Handley Page, Ltd., are supplying to the Chinese Government, the pilot, Capt. G. T. R. Hill, M.C., took the machine, which was of the standard two-engined type, to a height of 1,500 ft. The machine carried 18 persons, including the pilot, and the total weight in the air was 12,800 lbs. During the trip the machine flew with only one engine in use.

AIRISMS FROM THE FOUR WINDS



WHAT will the new "Centre" or "Coalition" Party do for the Nation? What a great chance for it upon really firm lines!

ANOTHER aeronautical £10,000 prize giver is to the fore in the *Daily Express*.

How about the Royal Aero Club and the regulations? We do not notice that they have yet been approved.

In France, profiteers of the people's necessities are to be deprived of all civil and political rights. That's the stuff to give 'em!

MR. SMILLIE at the Miners' Federation Conference on Tuesday was very insistent that "The Miners' Federation is always sane. It may from time to time do things which may seem to the outsider insane, but we know we are not insane, and we are not likely to do anything to injure our own reputation." Does Mr. Smillie then recognise that they cannot achieve the impossible.

Goods by Zeppelin between New York and Hamburg at £18 4s. a ton is not a bad head-line to attract. But will the hopes of Mr. Hans Kahrs of the Monopol Export and Import Unions in America to start this regular service in October be realised? A wealthy American banker (probably with some ultra-Scotch name) is supposed to be behind the venture. Wonder, anyway, what the United States Government will have to say to such a project.

In the Paris Victory March on Monday last, Lieut. Fonck, supported by Nungesser, Heurteaux, Maddon and other French "aces," was entrusted with the carrying of the colours of the French Air Service.

THE Royal Air Force contingent in London's Saturday Peace March will be led by Maj.-Gen. Sir J. M. Salmond, Brig.-Gen. C. L. Lambe and Brig.-Gen. C. A. H. Longcroft. The contingent will number 50 officers and 605 men, followed by four officers and 120 representatives of the W.R.A.F.

R 34, up above, is to be a feature of the Peace celebrations on Saturday.

THAT another milestone in aeronautics has been passed—and at top speed—by the out and return American journey of R 34 is an undeniable fact. Incidentally several other airship "records" have thereby been accomplished. American newspapers of July 9, airship borne, were obtainable in London on July 13. Another hustle was the bringing of the film recording the landing and other incidents of R 34's arrival and stay in America.

THIS film, weighing about 3 lbs., formed, by permission of the Air Authorities, part of the freight of R 34 on its return journey. The package reached the London offices of the Pathé Animated Gazette in Wardour Street on Sunday evening. On Monday the staff were busily engaged in preparing the copies of the film, and by the evening it was possible to distribute them to the picture theatres in the West-End area. By Tuesday the film had been circulated to all parts of the country, and the picture exhibited in some 250 cinemas. Before the active life of the film comes to an end three months hence, it will probably have been shown in 80 per cent. of the picture theatres of the country, so that millions of people will have a chance of seeing the first film brought to this country from the United States by air. Of course, it has never been possible before to exhibit a film in this country within five days of its departure from America.

Altogether 300 ft. of negative and another 300 ft. of positive film were sent over in the R 34. Before the positive could be made full use of a negative had to be obtained from it in order that further copies could be printed.

A VERY vivid idea can be obtained from this remarkable film of the immense size of the rigid airship, and it gives food for thought, that in the not far-distant future, the size of these great ships of the air is likely to be quite five times as great.



"Flight" Copyright.

BRIGHTON FROM ABOVE: The promenade and pier, snap taken from a five-seater passenger Avro plane

Special attention is paid in the R. 34 film to the landing operations, from the time that Maj. Pritchard descended by a parachute to the moment when the giant ship was safely moored. Those who may be inclined to think that the landing presents little difficulty will doubtless change their opinion when they have seen the extraordinary skill required to accomplish the operation. There are pictures of the crew of the airship, including, of course, the stowaway cat, which receives its full share of pictorial publicity; of the American soldiers who looked after the vessel during its stay in the United States, and of the damage done to the fabric when the mooring eyes were torn away by a gale. It is a remarkably interesting film, particularly when one remembers the circumstances under which it reached this country.

A PROPHECY: At *The Times* Book Club in Oxford Street, on Monday last, the following prediction was prominently displayed:—

"I look forward with certainty to the time when London morning newspapers will be selling in America in the evening, and *vice versa* in regard to American evening journals reaching London next day.—LORD NORTHCLIFFE, June 15, 1919."

AND in view of the above facts, it may well be that time will once more prove Lord Northcliffe not mistaken. Moreover, he deserves to be right for the really consistent way in which he has never wavered in his belief in the far-reaching possibilities of aeronautics. In addition he has backed his opinion with cash, and much of it. If in return he and his papers have obtained bold publicity, why again he deserves it, and in this respect more power to his remarkable combinations.

AGAIN, could anything be more calculated to insist upon the recognition of the air-way as a factor in the world's daily life than the enterprise which enabled the *Daily Mail* to reproduce on Tuesday morning photographs, and a wonderful series at that, of the Paris Victory March and scenes? Enterprise and imagination of this calibre merit recognition, and here Lord Northcliffe again scores by publicity for his great undertakings.

THE *modus operandi* was the employment for the photographic staff of our contemporary of two Caudron planes, piloted by M. Etienne Poulet and M. Dessous. M. Dessous had to land at Calais owing to rain squalls, but M. Poulet, leaving Paris at 3 p.m., arrived at Acton aerodrome with photographs and despatches at 9 p.m., bad flying weather being experienced all the way.

A FILM of the Paris march, taken at 3 p.m. on the Monday, was also brought over by aeroplane, delivered to the Topical Film Co., at 8 p.m., was then developed and was showing on the screen at the West-End Cinema, Coventry Street, at 10.20 p.m. In this the troops were seen passing under the Arc de Triomphe.

EVEN Iceland is to feel at this early stage of development, the benefit of aviation. A company has been formed with the object of establishing regular aeroplane traffic with the northern island, the main base being at Reykjavik.

AMONGST notabilities who, on Sunday last, selected the Way of the Air for reaching Paris from London, were His Highness the Maharajah of Kashmir and Jammu, with Capt. Zulcaga, Assistant Military Attaché of the Argentine Legation.

AWAY up in the Midlands, the plane has also again helped to overcome a difficulty. In order to conduct a special service on Thanksgiving Day, the Vicar of Blackpool, in an Avro, flew from Blackburn thus literally descending from the skies, to his congregation.

"SEA-PIE," that really humorous publication, is to have a Summer Number, Wednesday of this week, July 16, being the date named for its appearance. It is in aid of King George's Fund for Sailors and should be welcomed for that cause alone, irrespective of its deserving merits.

Before or After? Mrs. — goes for an aeroplane trip, which included looping the loop, at Eastbourne. This well-known War worker has been seriously ill. (*Daily Sketch*.)



"Flight" Copyright.

BRIGHTON FROM ABOVE: The West Pier, as seen from a five-seater Avro passenger machine, flying low at 80 m.p.h.

SOME DEVELOPMENTS IN AIRCRAFT DESIGN AND APPLICATION DURING THE WAR*

By the Right Hon. LORD WEIR OF EASTWOOD, P.C., Honorary Fellow

ANY attempt to review the progress or development of aviation during the War, and to confine such a review to the permissible limits of a paper, involves a mere indication of some of the more salient features of the development. Moreover, it is difficult to confine any such review entirely to the scientific or engineering aspect of the problem, on account of the peculiarly close association of the technique of construction with the technique of use. The war development of a technical product, such as an aeroplane, necessarily comprises the rapid embodiment of field experience in the design and production of matériel, and this compelling influence during the War largely governed the policy of design, supply and production.

In August, 1914, the British Air Services consisted of a Naval wing and a Military wing, the first controlled by the Admiralty, and the second by the War Office. The Naval wing, or Royal Naval Air Service as it was termed, possessed a total of 93 machines, the Military wing, or Royal Flying Corps, possessed a total of 179 machines. In October, 1918, just prior to the Armistice, the Royal Air Force possessed over 22,000 effective machines.

For the first two years of the War, the supply organisations for aircraft were Departments of the War Office and Admiralty, and no distinct technical departments existed. In January, 1917, the second Air Board, under the chairmanship of Viscount Cowdray succeeded the original Air Board under Viscount Curzon, and was constituted with additional duties and responsibilities. The Board became responsible for the allocation of aeronautical supplies between the two Flying Services, and for the supervision of design of all aeronautical material, this latter responsibility being vested in the technical department of the Air Board under Brig-Gen. Pitcher. Concurrently with this, the entire responsibility for supply and production of all aircraft matériel was handed over by the War Office and Admiralty to the Ministry of Munitions. Towards the end of 1917, a movement in favour of concentrating the entire administration of everything relating to War aviation in a single Government department crystallised in the constitution of the Air Ministry under a Secretary of State for Air, the Naval and Military Air Services being amalgamated to form the Royal Air Force in April, 1918.

The establishment of the Royal Air Force as an independent fighting force of the Crown has been thoroughly well justified, and the progress with regard to civil aviation in this country since the Armistice is largely due to the existence of a single Air Authority. Concurrently with the institution of the Air Ministry, the necessity of placing design and supply under a single authority was recognised by the constitution, within the Ministry of Munitions, of the Aircraft Production Department, which assumed full responsibility for all questions of design, supply and production.

An appreciation of the progress made in the domain of supply and production can be obtained from the fact that the average monthly delivery of aeroplanes either from British or foreign sources to our flying service during the first twelve months of the War was 50 per month, while, during the last twelve months of the War, the average deliveries were 2,700 per month. The capacity of the facilities in this country for the production of aeroplanes at the date of the Armistice was approximately 3,500 complete machines per month. To those associated with marine engineering it may be of interest to state that the total horse-power of aero engines produced in the last twelve months of the War, approximated to 8,000,000 of brake horse-power, a figure quite comparable with the total horse-power of the marine engine output of the country.

It may be of interest to recite some of the difficulties encountered in this work, although perhaps the more important of these difficulties were inseparable from the industrial position of the country at the period when the effort towards expansion was made:—

1. The lack of highly skilled labour, in particular that required for engine production, due to the almost complete absorption of such labour by other and earlier War enterprises.

2. The very high standard of material and workmanship involved so that safety might be ensured on the low permissible weight of the product.

3. The necessity of creating and building up entirely new manufacturing facilities and organisations.

4. The grave influence on production of modifications in design shown necessary by field experience, and the necessity for the rapid embodiment of these in the product.

5. The inability to take the fullest advantages of standardisation, owing to the necessity of making continuous progress in design and performances of machines.

6. The extreme complexity and variety of the elements contributing to the provision and equipment of War aeroplanes.

For example, the provision of satisfactory timber was a continual difficulty—at times an actual menace to the whole development. The textile problem became very grave when the supplies of Russian flax were cut off, and we were compelled to develop additional sources in Ireland and in the Colonies. Acute difficulties were experienced in connection with the development of the chemicals required for dope manufacture. At other times, the supply of machine guns gave much anxiety, while the development of the synchronising gear for these guns necessitated very urgent treatment.

The production of ball bearings involved the provision of new facilities on a colossal scale. The magneto supply involved the building up of an entirely new industry, while the manufacture of the numerous classes of instruments, cameras, radiators and other fittings in each case formed a problem by itself.

The solution of these problems from a production point of view constitutes an outstanding example of the enterprise courage and ingenuity of British industry. Many mistakes were made, but most of the difficulties were solved and many valuable lessons have been learned. It is a matter of great regret that so many of these enterprises, built up for specific War requirements, cannot be maintained under peace conditions. The development of civil aviation will not, for many years, absorb even a fraction of the War facilities, and a large amount of waste cannot be avoided in the reduction of these industries to a peace-time basis.

The constitution in 1917 of the first Technical Department dealing with aircraft design represented one of the most valuable steps in advance of previous organisation, and the work of this department very largely contributed to the position of technical supremacy held by this country at the close of the War. One of the factors contributing to this success was undoubtedly the adoption of a policy of giving ample freedom of opportunity to private designers, because in the development of a new art, such as aircraft design, any adherence to a single school of thought is dangerous, and the basis of design and experiment should be broadened as much as possible.

In the earlier days of the development the official Government designs of the Royal Aircraft Factory at Farnborough predominated, but the change in policy should not be taken to represent a reflection on the many valuable designs produced at Farnborough. These designs exercised a great influence on all future designs, while the meticulous care in the details, which was the feature of Farnborough practice, has been wholly useful and valuable in its general influence. To the British aircraft designers as a whole, and in particular to the pioneer designers and manufacturers, the greatest credit is due for their courage, skill and ingenuity.

Such is the briefest possible review of the political and administrative conditions under which the developments in War aviation have been carried out. In dealing with the salient features of progress and design two aspects have been separately treated—the aerodynamic aspect and the applicational aspect. As regards seaplanes it is not proposed to deal with their detail development, as this followed generally on the same lines as the aeroplanes with the special adaptations to meet marine conditions.

PART I.—Aerodynamical Aspect

Loading.—The outstanding feature desired in War aeroplane performance was expressed generally as the maximum of speed and climb, and it was soon perceived that this feature could be best achieved by a reduction of the weight carried per horse-power. The advance in other aerodynamic features such as wing section, reduction of air resistance, etc., was considerable, but could not be compared in importance with the reduction of weight per horse-power.

At the beginning of the war, loadings were about 23 lbs.

* Paper read at the Victory Meeting of the North-East Coast Institution of Engineers and Shipbuilders at Newcastle-on-Tyne on July 10, 1919.

per horse power and 4 lbs. per sq. ft. of lifting surface; at the close of the War, nearly 7 lbs. per horse power, and 10 lbs. per sq. ft. This is a remarkable result when it is considered that 7 lbs. per horse power represents the power loading of the total weight of the aeroplane, comprising the engine, its petrol and oil, the aeroplane itself, the pilot and all his fighting equipment. The rate of progress achieved in this development entailed a correspondingly large demand on the skill of the pilot, but it was found that the pilot's skill always advanced as rapidly as the demands upon it.

Wing Sections.—Wing sections steadily developed from the early sections with their hollow undersides and tops of almost circular camber, to the high efficiency sections of the present day with flat undersides bulged slightly downwards for the

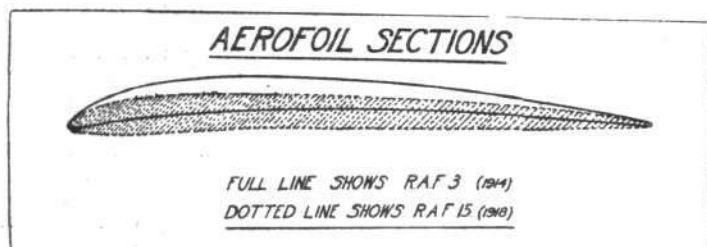


Fig. 1.

spars, and upper surfaces with a quick nose curvature, flattened top and easy run aft.

The illustration, Fig. 1, shows these differences fairly well. It may be noted as an interesting fact, that the Germans at no time made use of a high efficiency section such as the R.A.F. 15 shown.

Air Resistance.—No revolutionary advances have been made during the War in regard to the reduction of air resistance, but the general trend has been the more rigid application of previous knowledge; the conversion of piano wire or cable to streamline wires for main bracing is perhaps the most noteworthy feature. Until quite recently streamline wires were not adopted by any other country than this, although for fast aeroplanes the gain is considerable—approaching 10 miles an hour on a machine with a speed of 110 m.p.h.

The fuselages were made of fairer shape, and pilots and accessories were more carefully enclosed and protected.

Stresses and Factors of Safety.—At the outbreak of hostilities very little was known of the magnitude of the forces which might occur in flight, and certain more or less arbitrary rules were used in determining the strength of the aeroplane. Many possible methods of failure were never considered, and in some cases it was only through the light shed by certain accidents that progress was made. Certain definite forms of failure which are now always considered and guarded against were only discovered after long and careful examination and analysis of accidents.

When an aeroplane is flying level at a constant speed, the air loads acting vertically on the lifting surfaces (wings and

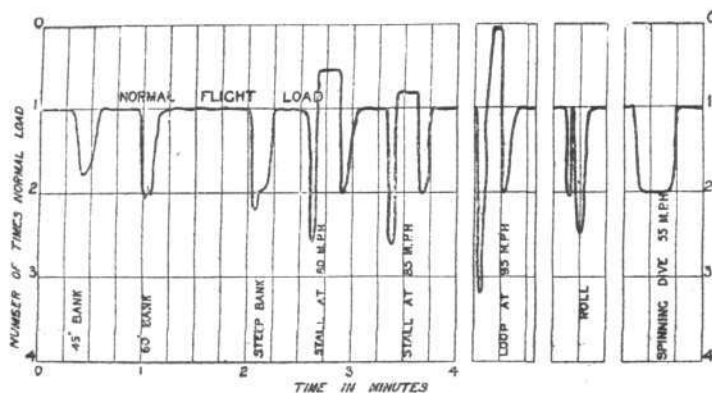


Fig. 2.—Accelerometer tests. Flight loads, B.E. 2c.

tail) must of course be equal to the total weight of the aeroplane. Other conditions must be simultaneously fulfilled, but this is the primary one.

This air load on the wings is known as the normal or unit flight load and is the basis of all strength calculations. It will be clear that in order to accelerate the aeroplane, extra forces must be applied to it, and so in many manoeuvres through which the aeroplane is put, extra loads are thrown upon the structure.

These forces are measured in terms of the unit flight load, and their magnitudes are determined either by calculation or by experiment. Both methods are used, and the advance in knowledge on this question, during the War, has been one of the principal causes of the elimination of practically all accidents which may be genuinely attributed to structural failure, and the great reduction in the percentage weight of aeroplane structures. The experimental method of determining the values of these loads consisted in carrying an accelerometer on an aeroplane. This instrument was self-recording and registered the amount of the accelerations given to the craft during various manoeuvres. Developed by Professor Lindemann and Dr. Searle at the R.A.E., its value has been considerable. The illustrations (Figs. 2 and 3) were obtained from one of their autographic records, and these and the attached table will give some idea of the values of the loads which occur during aerial manoeuvres. It must be understood that these loads are not the maxima which could occur, but only the maxima registered during the experiments.

Table of Loads

Ordinary bumpy weather ..	$1\frac{1}{2}$ to $\frac{1}{2}$ normal load.
Spiral dive at 70 m.p.h. ..	2.8 times normal load.
In a mock fight between S.E. 5 A. and R.E. 8.	3 times normal load was common; at times this increased to nearly 4.

Until all the loads which can possibly occur on an aeroplane are known it is impossible to design an absolutely scientific structure, but considerable progress has been made during the War in this direction, and it is at least possible now to design a structure that will not break in the air except under certain conditions against which the pilot can be warned.

In all other branches of engineering the prevention of failure is obtained by the introduction of a factor of safety, so that the highest possible loading which can occur in the structure stresses the material to only a fraction of its ultimate stress.

With an aeroplane this method is impossible on account of weight limitations, and in consequence a method is adopted of specifying load factors instead of factors of safety.

This method consists of determining—largely as a result of previous experience—what extra loads any particular type of aeroplane is likely to meet under the conditions of flight for which it is intended, and the structure is designed with just sufficient strength to carry these loads, that is to say, when these loads occur the material is stressed either up to its elastic or its ultimate stress. In the usual engineering sense, therefore, the factor of safety under this condition of flight is only one, while the load factor may be from four to seven, i.e., the loads which cause failure are from four to seven times normal flight loads as specified previously.

In aeroplanes of the scout class it has been customary to ask for a load factor of seven, but this only corresponds to a factor of safety of about 0.6. That is to say, the aeroplane by certain manoeuvres could be broken in the air. This fact is well known to all pilots and such a breakage now seldom occurs. It will be seen from the above table that in ordinary

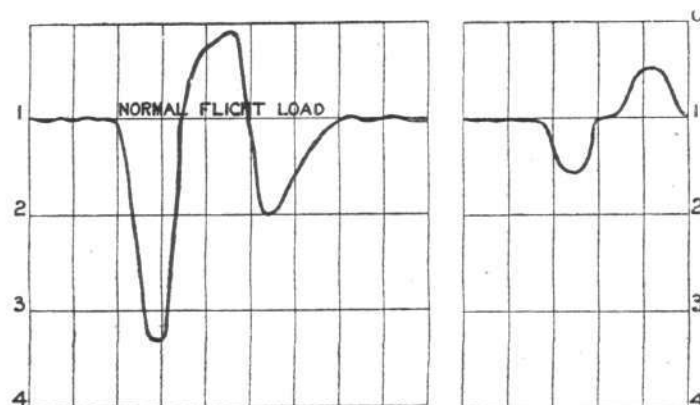


Fig. 3.—Accelerometer tests. Loads on B.E. 2c.

bumpy weather the loads were only increased about $1\frac{1}{2}$ times normal.

Since all other increased loads arise from "stunts," it would appear that commercial aeroplanes will seldom have to contend with the heavy loads met with in War flying, and it may be possible on this account to cut down load factors especially on heavier types. The illustration shows the difference between the loads in a loop and loads due to gusty weather upon the same aeroplane.

ENGINE 250 ROLLS-ROYCE Mk III				AERO PLANE: DE HAVILLAND 4.			
TYPE WATER COOLED V 60°				TYPE TWO SEATER TRACTOR			
NORMAL BHP 270 RPM 1600				NO OF WINGS BIPLANE			
MAX 285 RPM 1850				TOP WING SPAN 42' 6" CHORD			
NO FITTED ONE				BOTTOM - - 42' 6" -			
AIRSCREW RPM - ENGINE RPM 64				MIDDLE - - - -			
FUEL PER NORMAL BHP HOUR 5706 lbs				OVERALL LENGTH 30' 8" HEIGHT 10' 5"			
OIL 0254 lbs				GAP TOP TO BOTTOM TOP TO MID			
FUEL PER MAX BHP HOUR				GAP - CHORD DIEDRAL			
OIL - - - -				DIST BET LEAD EDGES OF LOWER WING & T.P.			
STRUCTURE	AREAS \square		WINGS 				

Fig. 4.—Analysis of weight. De Havilland 4.

ENGINE: 130 CLERGET				AEROPLANE, SOPWITH CAMEL, F/1/2				
TYPE AIR COOLED ROTARY				TYPE SINGLE SEATER FIGHTER				
NORMAL BHP 127.75 RPM 1250				Nº OF WINGS BIPLANE				
MAX - - - - RPM				TOP WING SPAN 28' CHORD				
Nº FITTED ONE				BOTTOM - 28' -				
AIRSCREW RPM = ENGINE RPM 1				MIDDLE - - - -				
FUEL PER NORMAL BHP HOUR 5715 lbs				OVERALL LENGTH 18' 8" HEIGHT 8' 6"				
OIL - - - - 1563 lbs				GAP TOP TO BOTTOM TOP TO MID				
FUEL PER MAX BHP HOUR				GAP - CHORD DIEDRAL				
OIL - - - -				DIST BET LEAD EDGES OF LOWER WING & T.P.				
STRUCTURE	AREAS			WEIGHTS LBS.		WT / SQ. FT.		% WEIGHT
	WINGS	121		TOP PLANE	108	9		
		110		BOTTOM PLANE	90	8		
				MIDDLE PLANE	-	-		
				STRUTS (Nº = 8)	19	-		
				EXTERNAL BRACING WIRES	20	-		
	TOTAL WINGS.			229	1.0			
	TAIL	14		TAIL PLANES	13	9		
		10.5		ELEVATORS	8	8		
		3		FINS	2	8		
		4.9		RUDDERS	3.5	7		
		TOTAL TAIL.		27	8			
	BODY			FUSELAGE	108	-		
				CHASSIS	70	-		
				TAIL SKID	3	-		
		CONTROLS	14	-				
TOTAL BODY.		195	8.45					
TOTAL WEIGHT OF STRUCTURE UNIT.		451	1.95	51.0				
POWER	PLANT		ENGINE DRY	375	2.9			
			PROPELLER	30	2			
			RADIATOR & PIPING & WATER	-	-			
			ENGINE ACCESSORIES	27	2			
		POWER UNIT, EXCLUDING FUEL OIL TANKS		432	3.4			
	SUPPLIES		FUEL TANKS	24	2.4			
			OIL TANKS & PIPING (PIPER FOR FUEL OIL 0.5%)	13	1.4			
			FUEL	180	1.4			
			OIL	63	5			
		TOTAL WEIGHT OF POWER UNIT.		712	5.6			
LOAD	RECONNAISSANCE ARMAMENT	CREW	180	-				
		INSTRUMENTS	10	-				
		CAMERA	-	-				
		W.T.	-	-				
		SUNDRIES	-	-				
		GUNS & AMMUNITION	101	-				
		BOMBS & GEAR	-	-				
ARMOUR		-	-					
TOTAL WEIGHT OF LOAD UNIT.		291	2.3	20.0				
TOTAL WEIGHT OF MACHINE.		1454	6.3 per sq ft	11.4 HP				

Fig. 5.—Analysis of weight. Sopwith Camel.

ENGINE, ROLLS-ROYCE				AEROPLANE, HANDLEY PAGE			
TYPE EAGLE B				TYPE 0400 TWIN TRACTOR			
NORMAL BHP 359 RPM 1800				NO OF WINGS BIPLANE			
MAX. - 368 RPM 1900				TOP WING SPAN 100' 0 CHORD 10 0			
NO FITTED TWO				BOTTOM 70 0 10 0			
AIRSCREW RPM - ENGINE RPM 6				OVERALL LENGTH 62 10 1/2 HEIGHT 22 0			
FUEL PER NORMAL BHP HOUR 50 lbs				GAP TOP TO BOTTOM 11 0			
OIL - 025 lbs				GAP - CHORD 1 1 DIEDRAL 4°			
FUEL PER MAX BHP HOUR				DIST BET LEAD EDGE OF LOWER WING & ELEV HINGE - 46			
OIL -							
STRUCTURE	AREAS		WINGS <				

Fig. 6.—Analysis of weight. Handley Page 0/400.

Analyses of Weights.—As in all forms of science, progress is very largely dependent on the ability to measure accurately the various items and factors. No genius can make up for the neglect of this essential. Once all the factors, whether they be weights, sizes or performances, are accurately measured, it is not so difficult to decide in which direction to proceed. A large amount of attention was given to the careful analysis of the weights of all available aeroplanes, good or bad, and tables were prepared of which samples are given in Figs. 4, 5 and 6.

By a study and comparison of these results in conjunction with the strength of the various aeroplanes, much knowledge of the possibilities of construction was obtained. The interesting fact was arrived at—that for a range of well-designed practical war types, the structural percentage remains roughly constant for aeroplanes of total weight varying from 1,000 to 30,000 lbs.

From a theoretical point of view, this is somewhat surprising, because, as is well known to engineers, the law of dimensions lays down that area increases as the square and weight as the cube of the dimensions, and that this will therefore put a limit on size. In fact, a very eminent aerodynamic theorist, working on these lines several years ago, put the limit of the weight of an aeroplane at about 10,000 lbs. There is very little doubt now that aeroplanes of 100,000 lbs. are a practical proposition.

Some of the reasons for this apparent theoretical discrepancy may be of interest. One is, that the larger the aeroplane, the more sober is the method of progression. No one wants to loop or do vertical banks on a big passenger aeroplane, and therefore it is not necessary to maintain as high a strength factor on the big type as on the small. As far as actual flying stresses are concerned, it would be possible for an aeroplane with a load factor of only $1\frac{1}{2}$ to be flown without collapse even on a windy day. This statement is only used for illustration, and must not be taken to suggest that a load factor of $1\frac{1}{2}$ would produce a practical aeroplane; it would probably be too weak to stand landing. Another reason for the discrepancy is, that the bigger the aeroplane the more detailed can be the design work, and it becomes possible to use material in a more efficient way.

It is not considered probable that aeroplanes made of wood will increase to a size representing a weight of much more than 40,000 lbs., but by the use of high grade steel and duralumin, it will certainly be possible to go far beyond this limit.

Influence of Tunnel Experiments.—At one time the small scale work carried out in the wind tunnel was regarded as of little practical value; now, judging by the results, I do not think that it would be too much to say that the work which was put into tunnel research, when this work at the National Physical Laboratory was under the direction of Mr. Leonard Bairstow, before as well as during the War, was the real basis of the technical success which we undoubtedly attained, particularly in the aerodynamic field. The data from such work is more useful to the designer from a comparative aspect than for the absolute values obtained, but without their help it is only too easy to stray off into blind alleys leading nowhere except to disappointment.

Some designers have undoubtedly a wonderful facility in guessing the next step to take, but they are too few and far between for responsible authorities to rely solely upon them. In any case such men always work best if there is a solid background of research knowledge behind them, from which they draw sometimes perhaps unconsciously. In 1914 no private firms had a wind tunnel of their own or went in seriously for research. Now there are four or five first-class installations in constant use by the designers of the manufacturing firms. As instance of more important results there now exists fairly exact knowledge of the best wing sections, strut shapes, propeller blades and body resistances.

Stability and controllability.—There are two means of obtaining stability in an aeroplane: first, by means of an automatic device, such as a gyroscope; and second, by such a disposition of the surfaces of the aeroplane that the machine has inherent stability. Very little success has been obtained from the first method, but the second is now very largely employed.

Questions relating to stability and controllability are intimately connected, but in one sense they are distinct. Thus it is possible to have an unstable aeroplane which is readily controllable and very popular with pilots.

Stability may be considered under three heads:—

- Longitudinal stability;
- Lateral stability; and
- Directional stability.

The first, longitudinal stability, is obtained by means of the tail plane, and the size of this for any particular type determines within limits the degree of stability. The funda-

mental point, however, is the position of the centre of gravity of the aeroplane relative to the main planes. If this is too far aft no tail plane can be found to give stability. The farther forward the centre of gravity, the smaller is the tail plane required.

The problems of lateral and directional stability are very closely connected, and must be considered together. Lateral stability is obtained by giving the main planes a dihedral angle, and directional stability is obtained by a proper regard to the dimensions and dispositions of the fins and rudders. The area of the fin and rudder required is a function of the dihedral angle.

The outbreak of war found us in a very favourable position with regard to the development of an inherently stable aeroplane. The importance of this feature from a military point of view had been fully realised, and special efforts had been made to produce a stable and at the same time controllable aeroplane. That these efforts were successful was largely due to the late E. T. Busk, of the Royal Aircraft Factory, as it was then called, and the "B.E.2c" aeroplane, which embodied the results of his work, had been fully tested and demonstrated to possess complete adherent stability prior to the outbreak of war. Unfortunately, Mr. Busk was killed in a flying accident shortly after his experiments had been brought to a successful issue. However, his full scale research had been carried so far that the principles underlying the design of this machine could be applied to any other design of aeroplane. Subsequently nearly all machines were designed for inherent stability, except such types as were considered to be more suitable for their specific work if a certain degree of stability were sacrificed for very quick manoeuvrability. An impression was prevalent, at any rate during the first two or three years of the War, that a stable aeroplane must necessarily be very heavy on its controls, and since quick manoeuvrability was an essential for fighting scouts, the aim of designers, encouraged by fighting pilots, was to obtain the maximum controllability and quickness of handling, irrespective of stability.

It was gradually realised that this was a mistaken view, and that the comparatively poor manoeuvrability of some of the earlier stable machines was due, not to the fact of these machines being stable, but to the particular design of the controlling surfaces. A very great amount of research into the conditions governing stability and controllability was carried out both from the theoretical and experimental standpoint, and this revealed enough data to enable aeroplanes to be designed combining inherent stability with good manoeuvrability, and as a result the prejudice against stability in small fighting aeroplanes quickly disappeared.

A good example of the advantage of this is afforded by Capt. Ball's wonderful return to our lines on his stable "S.E.5" machine after his controls had been almost completely shot away. The aeroplane practically flew itself back, and with only half of his normal elevator control he was able to make a safe landing on the aerodrome. Such a feat would have been out of the question on an unstable machine.

At the end of the War we were calling for aeroplanes with neutral stability for fighting work, i.e., aeroplanes which followed the pilot's mind and hand in whatever attitude they were put. For bombing and long-distance work stability is a very important asset, as it relieves the pilot of fatigue, and facilitates the maintenance of his course and his sighting for bomb dropping. The disadvantages of not putting a sufficient amount of study into these features are demonstrated by German practice. Although a few of their small aeroplanes were fairly manoeuvrable, their larger ones did not compare favourably with our own when tested under the same conditions, and in the case of their very large bombing aeroplanes we had evidence that the pilot's difficulties on a long flight were very considerable, and it is probably not too much to say that the heavy proportion of German bombers which were crashed on returning from their raids was largely due to lack of stability and controllability.

Monoplane, biplane or triplane.—During the War all these types have been experimented with, and, in fact, have been built on a production scale, and it cannot be definitely stated that one type is more suitable than another without knowing the exact purpose for which the aeroplane is required.

Broadly, the comparative advantages of the three types are as follows:—In comparison with the biplane, the monoplane is 5 per cent. more efficient as a weight carrier per square foot, and can be made to afford a better fighting view. On the other hand, it is weaker for the same weight of structure, and is less manoeuvrable for equal total weight. Similarly the triplane, comparing it to the biplane, is 5 per cent. less efficient, but is more manoeuvrable, and affords opportunities

for a deeper and therefore stronger main girder, which gives it an advantage for the larger sizes. Incidentally it is also more difficult and expensive to produce. The balance between advantage and disadvantage therefore depends upon the particular function required from an aeroplane, and also on the skill of the designer in overcoming the peculiar difficulties of this problem. But the general conclusion is that the monoplane is most suited for the very small aeroplane; the biplane for all general sizes, and probably the triplane for the very large sizes. Experience during the War in general bears this out, although there have been instances which might be taken as contradictory to this statement.

The importance of the successful use the Germans made of their Fokker monoplane should not be exaggerated, as the real reason for this success was the production in large numbers of a good single-seater with a rotary engine copied from the French Gnome, combined with the new synchronised guns, and a fresh method of attack. When we tested the aeroplane ourselves, and compared it with our own under similar conditions, its performance was, in fact, very little superior to the "B.E.2c" against which it was so effective.

Our designers, on the other hand, made a very successful triplane fighter with a similar sort of engine. The main objectives of the designer in this case were handiness and view ahead. Handiness was obtained by very small span, and view by placing the pilot so that his eye was in the line of the centre plane. However, as far as this country was concerned, the general decision was the selection of the biplane as the simplest and soundest type for all ordinary work.

Climb requirements.—The most valuable quality in a war aeroplane and the one most difficult to supply is, no doubt, climb. Practically all other considerations are opposed to fast climb, such as high superficial loading, direct drive engines, high speed and long range. But the demand by pilots for a high rate of climb, both as a protection against anti-aircraft fire and to increase their fighting capacity, was so great that this quality had to be provided. The range of guns, or rather their power of accurate shooting at a height, increased in an astonishing degree during the War. In the early days a height of 3,000 ft. was reasonably safe, and aeroplanes could do their work at that height. Then it was increased to 6,000, 10,000 and 15,000 ft. By the end of the War shooting even at 20,000 ft. was unpleasantly accurate. Whenever a new type of aeroplane appeared which could operate at an increased height, it was immune for a period, and could do its work almost unmolested, and in some cases without being perceived; but this period seldom lasted long, and sometimes even before the new type was appearing in sufficiently large numbers to count seriously it was outraged.

The same state of affairs applied to the height at which fighting took place, which gradually increased from year to year up to 20,000 ft. In order that the pilot could fight in a satisfactory manner he required a good rate of climb as well as the uppermost position. The difficulty of providing climb in an aeroplane during the first two years of the War was enhanced by the constant increase in the number of accessories required to enable the extra military functions to be carried out. These accessories added largely to the weight and also to the air resistance, and it was not until specially designed aeroplanes appeared that the position became satisfactory.

Interaction of engine and aeroplane design.—Progress in aeroplane was very much bound up with the progress in engine design; in fact, it can be broadly stated that during the whole of the War the aeroplane designers were waiting upon the engine designers, and as soon as any new engine was developed to a satisfactory point it was but a short time before aeroplanes were in service, making the maximum use of such an engine, or at any rate a thoroughly effective use.

It is interesting to compare German practice with our own. The Germans realised at an early stage the necessity of large engines, and they concentrated their attention on the production of a first-class but simple type of motor. This had a straight row of six cylinders of an average weight per horse-power, neither excessively heavy nor particularly light. They standardised this type at a comparatively early date, and consequently made early advances in production and reliability.

Our policy was by no means so definite, and our engine designers worked on a number of different types: air-cooled rotary, radia¹, and in V, water-cooled, 8-cylinder, 12 cylinders

in V, and 6 cylinders in line. At no time did we rigidly standardise a single type. In consequence we had far bigger difficulties in production, and on the whole our motors were not so reliable. Ultimately, however, we progressed much further than the Germans, both in the power of the engine and in the reduction of weight per horse-power.

The reduction of weight of the aeroplane per horse-power can be obtained in either of two ways: (1) by having a very powerful engine of average weight per horse-power, so powerful that the weight of the pilot and his military gear is relatively an unimportant factor; or (2) by having an engine of very light weight per horse-power. This point is best illustrated by a short analysis in weight per horse-power, comparing two aeroplanes which are both single-seated fighters, and of the same lbs. per horse-power.

Large aeroplane—				lbs./h.p.
300 h.p. engine, weight	..	..	..	3½
2 hours' fuel, oil and tanks	..	..	..	1¼
Pilot and gear	..	..	..	1
Aeroplane structure weight	..	..	..	3
				9

Total weight, 2,700 lbs.

Small aeroplane.				lbs./h.p.
200 h.p. engine, weight	..	..	..	2¼
Fuel, oil and tanks	..	..	..	1½
Pilot and gear	..	..	..	2
Aeroplane structure weight	..	..	..	3
				9

Total weight, 1,800 lbs.

The first type has a large water-cooled engine, is economical in fuel, and by reason of the size of the engine, the pilot and his gear account for only a small proportion of the total weight; whereas on the small aeroplane the engine is a light weight air-cooled engine of heavier consumption, and the weight of pilot, etc., is a much larger proportion of the whole weight.

The two aeroplanes would practically give the same performance, but the smaller probably would be the better

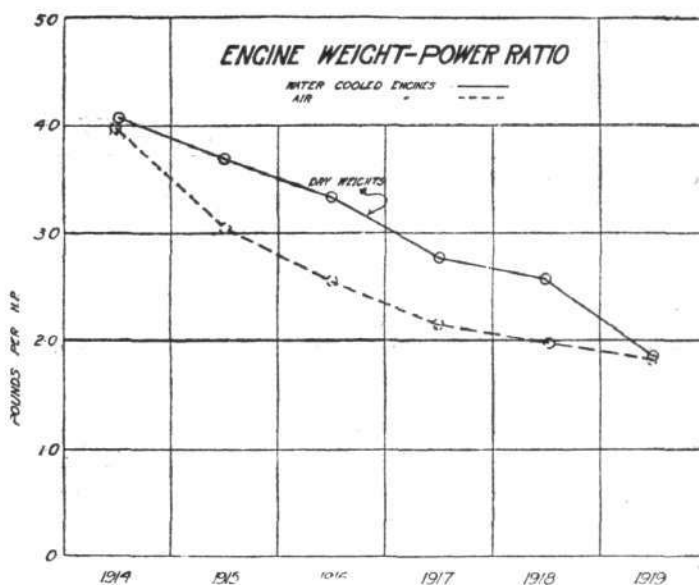


Fig. 7.

fighter because of its greater manœuvrability. There are many other factors to take into account, such as reliability, pilot's view, ease of manufacture, etc., all of which must be considered before coming to a decision as to which is the better type.

Generally speaking, the tendency during the War was towards the heavier aeroplane, although there were two periods when the light-weight engine reversed this. One was when the 80 Le Rhone Sopwith Pup supplanted the 140 R.A.F. B.E. 12, and the two 100 h.p. pushers D.H. 2 and F.E. 8; the other was when the small air-cooled Wasp engine was competing with the 275 water-cooled Rolls-Royce Falcon.

(To be continued.)

The Douglas-Pennant Case

A SECOND White Paper (Cmd. 254) has been issued by the Air Ministry containing a further number of letters

relating to the termination of the appointment of the Hon. Violet Douglas-Pennant as Commandant of the Women's Royal Air Force.

A £10,000 RELIABILITY PRIZE

THE Australian Government having offered £10,000 for a flight between Australia and the *Daily Mail* prize of £10,000 for a flight between Great Britain and America having been won, the *Daily Express* is offering a prize of £10,000 with the object of establishing aerial communication on a commercial basis between Great Britain and South Africa and India.

The preliminary announcement of the offer states that, in general, the terms and conditions of this £10,000 competition may be outlined as follows:—

- (a) All types of aircraft are eligible for entry.
- (b) The competition is open to all the world, except late enemy countries.
- (c) All aircraft entered must carry a useful load of at least a ton both on the outward and homeward flights.
- (d) Each entrant must produce one aircraft for the flight to and from South Africa, and one aircraft of a similar type for the flight to and from India.

(e) The factors considered in the award will be:—

Average reliability.

Airworthiness and general conduct of aircraft entered.

Average gain in speed over the established means of transport.

(f) As it is aimed that each aircraft shall carry a useful load of saleable or exchangeable commodities or raw materials, it will be to the advantage of competitors to study the commercial situation as affecting this interchange.

(g) Particulars of entries will be announced within the next few days.

(h) Competitors may undertake the flights at any date between the closing of the entries list, which will be announced later, and June 1, 1920. Priority in completion will not prejudice the success of later but obviously more efficient performances.

(i) One complete failure by a competitor will involve disqualification for the award.

Further details will be announced later.



AVIATION IN PARLIAMENT

Navy, Army, and Air Forces (Estimates)

SIR DONALD MACLEAN, on July 7, asked the Lord Privy Seal when he proposes to re-introduce the Estimates for the Navy, Army, and Air Forces in accordance with his promise?

Mr. Bonar Law: My right hon. friend is mistaken in saying that I gave any promise that new Estimates would be introduced, though I said that the suggestion would be considered. I did say, however, that I thought there ought to be a discussion of the whole subject in the House when we revert to a peace footing, but I do not think that the time has yet come when it would be useful to have that discussion.

Rigid Airships

LIEUT.-COMDR. KENWORTHY, on July 9, asked the First Lord of the Admiralty what will be the total cost of the six rigid airships of an improved type now under construction for the Navy; whether the signature of Peace will enable the building of some or all of these expensive airships to be postponed; and, if not, why is there no difference between the War and Peace airship programmes?

Mr. Long: The estimated total cost of the six rigid airships is £2,200,000. The rigid airship programme was thoroughly revised shortly after the Armistice was signed, and was reduced as far as is consistent with the Peace requirements of the Navy, and with the necessary development of the Airship service. No further reduction is at present contemplated. It should be noted that the six airships are not, as implied in the question, of a single type, but of several types, representing successive stages of development.

Capt. Wedgwood Benn: Is it proposed to hand over the construction of the lighter-than-aircraft to the Air Ministry; and, if so, when?

Mr. Long: That does not arise on this question at all.

Lieut.-Comdr. Kenworthy: Is it not to be taken into consideration, in the interests of scientific experiment, at any rate, to postpone this building and the expenditure of this money until a later date, and until we have had more experience of this kind of vessel?

Mr. Long: Those questions have already been taken into consideration by the Board of Admiralty in arriving at their decision.

Experts

CAPT. WEDGWOOD BENN asked the Under-Secretary of State to the Air Ministry whether any steps are being taken to retain for the public service the advantage of the expert designers and craftsmen engaged upon airship and aeroplane construction during the War?

Maj.-Genl. Seely: It is for the Admiralty to reply as regards airships. As regards aeroplanes, the position during the War generally was that the expert designers were in the employment of the contracting firms, experts on such general questions as aerodynamics, strength of materials, etc., being retained by the State. It is hoped to maintain this position under the peace organisation.

Wendover Aerodrome

MR. BRIANT, on July 10, asked the Under-Secretary of State to the Air Ministry if the aerodrome at Wendover is intended to be a permanent training centre for the Air Force; and, if so, for how many men is it intended to provide?

Maj.-Genl. Seely: The answer to the first question is in the affirmative. The answer to the second will depend on the peace strength which may be approved for the Royal Air Force.



Temporary Opening of Oversea Civilian Flying

THE Air Ministry on July 13 made the following announcement:—

Pending a definite agreement in accordance with the Air Convention, and in order to enable French and British aircraft firms to send machines to London and Paris, should they so desire, during the forthcoming Peace Celebrations Week, arrangements have been made with the French Government for the opening of civil communication by air between London and Paris from July 13-20 inclusive.

British machines visiting Paris will land at Le Bourget only, and French machines visiting London at Hounslow only, except in emergency. All machines will cross the French coast between Calais and Boulogne, and the English coast between Folkestone and Dungeness.

All machines taking advantage of these facilities must be provided with, and carry, certificates of airworthiness, issued by their respective Governments. Passports will be carried by all civilian personnel. A full list of passengers, showing their destinations, will be carried by the pilot in charge of the machine. No goods or merchandise may be carried.

It is to be clearly understood that from July 13-20 inclusive, no machine taking advantage of this temporary arrangement, will, in any circumstances, fly over London or Paris.

Roll of Honour

Wounded

Lieut. D. Neil, Can. For. Corps. attad. R.A.F.

"Soldiers', Sailors', and Airmen's Families"

At the annual meeting of the Soldiers' and Sailors' Families Association on Monday, it was decided to include the word "Airmen" in the title, following the reading of a letter from Queen Alexandra, who is president of the Association. Her Majesty's letter was as follows:—

"Dear Sir James Gildea,—I hardly like the idea of changing our old title of 'The Soldiers' and Sailors' Families Association,' the name by which we are so well known everywhere, I hope, and under which name, I am proud to think, have done so much good for the country, especially during the late War.

"It has struck me, however, from conversations I have had with others on the subject, that our airmen having helped England so splendidly to win the great War—and the new Air Force, too, being now established as a distinct service—we might, and perhaps ought, to add 'Airmen' to the name of the Association, and that in future our title should be 'The Soldiers', Sailors', and Airmen's Families Association.

"What do you think of this change? If you approve of it, please let my suggestion be known at the annual meeting of the Association to-morrow, and tell me what is thought of it. I strongly deprecate any greater change in our name than what I have above suggested.

"ALEXANDRA."

A.M. Civil Aviation Department

THE telegraphic address of the above department should read: "Civiatory, Estrand, London"—not as misprinted last week.

First Civilian Pilot since Armistice

THE first civilian flying certificate issued by the Royal Aero Club since the Armistice has been secured by Pte. J. Hardy, an Australian soldier, living in Earl's Court Road, who claims to have learnt to fly in seven hours at Hendon.

"Flips" at Brighton

DURING the past week the passenger flights carried out by the Avro Co. from the Ladies' Mile at Brighton have proved very popular; on the opening day more than 100 passengers were carried. Capt. Kennard is in charge.

And at Sandown

THE Avro seaplane service at Sandown, which is under the careful direction of Capt. F. Warren Merriam, A.F.C., has also been doing good business since its introduction on Monday last. The passengers are taken up at the pier-head.

Air Work on Indian Frontier

ACCORDING to a report from Chaman, via Peshawar, our aeroplanes on July 9 bombed a small gathering of tribesmen near the Bogra Pass.

THE ROYAL AIR FORCE

London Gazette, July 4.

Flying Branch.

The initials of Lieut. (actg. Capt.) E. C. Morris are as now described, and not "E. E.," as stated in *Gazette* of May 9.

The initials of Sec. Lieut. F. N. Hargreaves are as now described, and not "F. U.," as stated in *Gazette* of May 13.

The initials of Sec. Lieut. I. D. Macintyre are as now described, and not "J. D.," as stated in *Gazette* of May 16.

The initials of Sec. Lieut. S. G. Cockburn are as now described, and not "F. G.," as stated in *Gazette* of May 20.

The initials of Sec. Lieut. R. E. Barrett are as now described, and not as stated in *Gazette* of May 23.

The initials of Sec. Lieut. J. H. Perring are as now described, and not "G. H.," as stated in *Gazette* of May 20.

The initials of Sec. Lieut. F. N. York are as now described, and not "F. W.," as stated in *Gazette* of May 23.

The initials of Lieut. J. A. N. Fleming are as now described, and not "J. A.," as stated in *Gazette* of May 27.

The surname of Sec. Lieut. F. W. Trend is as now described, and not "Trench," as stated in *Gazette* of May 9.

The surname of Lieut. W. H. Rilett is as now described, and not "Relett," as stated in *Gazette* of May 13.

The surname of E. W. Everiss is as now described, and not "Encriss," as stated in *Gazette* of May 20.

The surname of Lieut. A. W. Matson is as now described, and not "Watson," as stated in *Gazette* of May 23.

The surname of Lieut. A. V. Wells is as now described, and not "Wills," as stated in *Gazette* of May 27.

The name of Sec. Lieut. J. McRobb is as now described, and not "J. M. Robb," as stated in *Gazette* of May 20.

The notification in *Gazette* March 11 concerning Sec. Lieut. A. R. Giroux is cancelled (substituted for notification in *Gazette* April 11).

The notification in *Gazette* March 18 concerning Sec. Lieut. F. W. V. Blommestein is cancelled.

The notifications in *Gazette* April 1 concerning the undermentioned officers are cancelled:—Lieut. R. A. Maddock, Lieut. W. C. McMurray.

The notification in *Gazette* May 27 concerning Lieut. O. A. Moore is cancelled.

The notification in *Gazette* June 27 concerning Lieut. R. C. F. Nailer is cancelled.

Administrative Branch

Cpts. to be Cpts., from (S.O.):—E. R. Whitehouse; April 11. A. P. M. Sanders (on reduction of establishment); May 1. F. J. Gray, O.B.E.; June 1.

F. Tuttle, D.C.M. (Capt. and Qtr., R. Berks. R.), is granted a temp. commn. as Capt.; April 1, 1918.

Lieuts. (A.) to be Lieuts.:—A. L. C. Hartland-Rowe; Sept. 3, 1918 (substituted for notification in *Gazette* Oct. 22, 1918). J. D. G. MacRae; June 18.

Lieuts. to be Lieuts.:—A. A. Kennedy, from (S.O.); April 28. F. D. Wright, from (K.B.); June 19.

Sec. Lieut. (Hon. Lieut.) G. Simmers to be actg. Lieut. while employed as Lieut. (from Feb. 1 to April 30).

Sec. Lieut. H. A. Pippet to be actg. Lieut., without pay and allowances of that rank, whilst employed as Lieut. (from Sept. 16, 1918, to April 30).

Sec. Lieut. (Hon. Lieut.) G. Dodds to be Sec. Lieut. (Hon. Lieut.), from Unemployed List; March 24, prec. next below D. H. C. Newth).

Sec. Lieut. F. H. M. Francis-Hawkins (late Gen. List, R.F.C., on prob.) is confirmed in rank as Sec. Lieut.; Sept. 18, 1918.

The following relinquish their commns. on ceasing to be employed:—Lieut. S. H. Evans (Sec. Lieut., N. Staffs. R.); Aug. 26, 1918. Capt. H. S. Blockey (Capt., S. Staffs. R.); June 23.

(Then follow the names of 32 officers who are transf'd. to the Unemployed List under various dates.)

The initials of Lieut. R. S. C. D. Ashby are as now described, and not as stated in *Gazette* May 27.

The notification in *Gazette* of March 4 concerning Sec. Lieut. L. H. Meyer is cancelled.

The notification in *Gazette* of March 25 concerning Lieut. S. F. Thompson is cancelled.

The notification in *Gazette* of May 6 concerning Lieut. W. U. Hughes is cancelled.

The notification in *Gazette* of May 23 concerning Sec. Lieut. (actg. Capt.) W. Lienard, M.B.E., is cancelled.

The notification in the *Gazette* of June 27 concerning Sec. Lieut. J. Dale is cancelled.

Technical Branch

Lieut. (Hon. Capt.) (actg. Capt.) W. E. Smith to be actg. Maj. whilst employed as Maj., Grade (A.), from Sept. 9, 1918, to April 30.

Lieut. G. G. Bailey, D.F.C., to be Lieut., Grade (A.), from (Ad.); May 24.

Sec. Lieut. H. Nixon to be Sec. Lieut., Grade (B.), from (Ad.); June 20.

Sec. Lieut. E. G. Hellard (late Gen. List, R.F.C., on prob.) is confirmed in rank as Sec. Lieut., Grade (A.); May 14, 1918.

Sec. Lieut. (Hon. Capt.) C. B. Dick-Cleland (Capt., N.Z.A.S.C.) relinquishes his commn. on ceasing to be employed; May 2.

(Then follow the names of 23 officers who are transferred to the Unemployed List under various dates.)

Lieut. (Hon. Capt.) C. A. E. Lloyd relinquishes his commn. on account of ill-health, and is granted the rank of Maj.; June 24.

Capt. R. C. Gallop (Scottish Rifles) resigns his commn., and is permitted to retain his rank; July 5.

Capt. B. May (R.W. Kent R.) relinquishes his commn. on account of ill-health contracted on active service; June 1 (substituted for notification in the *Gazette* of April 25).

The initials of Sec. Lieut. R. B. Cherry are as now described, and not "R. O.," as stated in the *Gazette* of May 9.

The initials of Sec. Lieut. L. T. W. Sanderson are as now described, and not "L. T. K.," as stated in the *Gazette* of May 20.

The surname of Sec. Lieut. R. G. Wells is as now described, and not "Wills," as stated in *Gazette* of May 20.

The notification in *Gazette* May 13 concerning Sec. Lieut. H. J. Wadkin is cancelled.

The notification in *Gazette* June 13 concerning Sec. Lieut. J. Dale is substituted for the notification in *Gazette* May 27.

Physical Training Branch

One officer transferred to Unemployed List.

Medical Branch

Three officers transferred to Unemployed List.

Dental Branch

G. F. Charles is granted a temp. commn. as Lieut.; July 1.

Memoranda

Sec. Lieut. (actg. Capt.) W. Lienard, M.B.E., to be Lieut.; Feb. 24, and to retain his actg. rank till April 30.

(Then follow the names of 23 Overseas Cadets granted temporary commns. as Sec. Lieuts., and 183 graded hon. commns. as Sec. Lieuts.)

Temp. Hon. Lieut. M. P. Holmes relinquishes his commn. on ceasing to be employed; Feb. 16.

(Then follow the names of 7 officers who are transferred to the Unemployed List under various dates.)

The notification in *Gazette* March 7 concerning Sec. Lieut. (actg. Capt.) W. Lienard, M.B.E., is cancelled.

Sec. Lieut. C. W. Kerr to take rank and precedence as if his appointment as Sec. Lieut. bore date March 22, 1918.

London Gazette, July 8.

The following temporary appointments are made:—

Staff Officers, 3rd Class (Air).—Capt. R. G. Parry, D.S.O.; July 4, 1918 (substituted for notification in *Gazette* Oct. 18, 1918).

Staff Officers, 4th Class (T.).—Lieut. S. J. Furse; Sept. 14, 1918.

The notification in *Gazette*, June 20 concerning Capt. W. A. A. Chauncy is cancelled.

Flying Branch.

Maj. F. W. Lucas, O.B.E., to be actg. Lieut.-Col. (Airship) while specially employed; May 26.

Capt. W. H. Mackenzie to be actg. Maj. while employed as Maj. (A. and S.); May 1.

Sec. Lieut. C. W. Sutcliffe to be Sec. Lieut. (A.), from (Ad.); April 8.

P.F.O. G. L. Barrett (late R.N.A.S.) is granted a temp. commn. as Sec. Lieut. (K.B.); May 16, 1918 (substituted for notification in *Gazette*, July 9, 1918).

D. J. Stewart (temp. Sec. Lieut., R.E.) is granted a temp. commn. as Sec. Lieut. (O.); April 24, 1918.

Sec. Lieut. G. A. Lynch (Sec. Lieut., Yorks L.I.) is granted a temp. commn. as Sec. Lieut. (O.); Aug. 8, 1918.

The following relinquish their commns. on ceasing to be employed:—

Sec. Lieut. R. Smith; Oct. 19, 1918, and is granted hon. rank of Sec. Lieut. (substituted for notification in *Gazette* Oct. 18, 1918). Lieut. D. Leeson (Capt., Brit. Col. R.); Nov. 19, 1918. Lieut. F. J. Simpson (Lieut., Brit. Col. R.); Dec. 18, 1918 (substituted for notification in *Gazette* June 6). Sec. Lieut. (Hon. Lieut.) A. L. G. Price (Somerset L.I.); Jan. 25. Lieut. A. Gibson (Lieut., Sask. R.); Feb. 19. Sec. Lieut. W. R. Hudson (Lieut., Manitoba R.); March 10. Lieut. G. E. Leishman (Lieut., Cent. Ont. R.); March 31. Sec. Lieut. A. E. White, M.C. (Lieut., Can. Rly. Servs.); April 8. Lieut. J. P. Francis (Lieut., Can. Hrs.); April 14. Sec. Lieut. (Hon. Lieut.) G. W. Drowne (Lieut., Manitoba R.); April 22. Lieut. W. J. Gillespie (Lieut., E. Ont. R.); April 30. Lieut. G. E. Lucas (Lieut., W. Ont. R.); Lieut. D. R. Smith (Lieut., Quebec R.); May 4. Lieut. D. R. McLaren, D.S.O., M.C., D.F.C.; May 14. Lieut. J. E. Price (Lieut., Sask. R.); May 16. Sec. Lieut. (Hon. Lieut.) H. Symons (Lieut., Herts. R., T.F.); May 23. Lieut.-Col. A. C. Critchley, C.M.G., D.S.O. (Lieut.-Col., temp. Brig.-Gen., Lord Strathcona's Horse); May 31. Lieut. H. F. Moore (Lieut., Manitoba R.); June 10. Capt. R. I. Van-Der-Byl (Lieut., temp. Capt., Brit. Col. R.); June 23. Lieut. R. H. Luxton (Lieut., Can. F. Art.); June 27. Lieut. A. H. Hinton (Lieut., Can. F. Art.); June 28.

(Then follow the names of 192 officers who are transferred to the Unemployed List. We regret that owing to great pressure on our space, it is impossible to reprint this portion of the List.—Ed.)

Maj. G. S. M. Ashby (R.G.A.) relinquishes his commn. on account of ill-health contracted on active service; June 25.

Capt. E. G. F. Thompson relinquishes his commn. on account of ill-health, and is permitted to retain his rank; April 17 (substituted for the notification in *Gazette*, Oct. 1, 1918).

The following Lieuts. relinquish their commns. on account of ill-health, and are permitted to retain their rank;—W. M. Davidson (contracted on active service; Jan. 22 (substituted for the notification in *Gazette*, Jan. 21). S. Anderson (caused by wounds); Feb. 22 (substituted for the notification in *Gazette*, Feb. 21). O. A. Moore; May 23 (substituted for the notification in *Gazette*, April 15).

Lieut. F. T. S. Menendez, M.C., relinquishes his commn. on account of ill-health, and is permitted to retain his rank; June 5 (substituted for the notification in *Gazette*, March 14).

The following Sec. Lieuts. relinquish their commns. on account of ill-health, and are permitted to retain their rank:—H. L. Buckley; June 24. G. P. Dymond; June 27. C. S. Gregg (contracted on active service); June 28. C. R. Abell; July 4.

The initials of Sec. Lieut. W. J. Cairns are as now described, and not "W. G.," as stated in *Gazette*, May 6. The initials of Sec. Lieut. F. N. York are as now described, and not "F. W.," as stated in *Gazette*, May 23.

The notification in *Gazette*, Sept. 17, 1918, concerning Sec. Lieut. E. Tomkins is cancelled. The notification in *Gazette*, Feb. 11 concerning Lieut. R. K. McConnell is cancelled (notification in *Gazette*, April 1, to stand). The notification in *Gazette*, March 7 concerning Sec. Lieut. T. E. W. Browne is cancelled (notification in *Gazette*, April 1, to stand). The notification in *Gazette*, March 11 concerning Sec. Lieut. C. S. Muir is cancelled (the notification in *Gazette*, April 1, to stand). The notification in *Gazette*, March 18 concerning Sec. Lieut. D. J. Brooks is cancelled (the notification in *Gazette*, April 1, to stand).

The notification in *Gazette*, March 25 concerning Lieut. (actg. Capt.) R. McLaughlin, D.F.C., is cancelled (the notification in *Gazette*, April 4, to stand). The notification in *Gazette*, April 1, concerning Sec. Lieut. (Hon. Lieut.) A. K. Boning is cancelled. The notification in *Gazette*, May 6 concerning Sec. Lieut. S. A. Church is cancelled. The notification in *Gazette*, May 27 concerning Sec. Lieut. M. M. McRae is cancelled.

Administrative Branch.

Cpts. to be Cpts.:—W. S. Evans, from (S.O.); Jan. 19. A. C. Bolton, M.C., from (S.O.); April 1. P. F. J. Kent, from (A.); April 17.

Lieut. G. A. McMillan to be graded for purposes of pay and allowances of Capt. whilst employed as Capt.; May 1 (substituted for notification in *Gazette* May 30).

Lieuts. to be Lieuts.:—A. W. Allan, from (A.); June 4, 1918 (substituted for notification in *Gazette*, March 28. F. A. Gill, from (O.); Sept. 13, 1918).

D. W. McEwan (Lieut., Arg. and Suth. Highrs.) is granted temp. commn. as Lieut.; Oct. 28, 1918.

Sec. Lieut. P. Reed to be Sec. Lieut., from (A.); June 17.
 Sec. Lieut. F. A. A. Hewson to be Sec. Lieut., from (O.); Dec. 19, 1918 (substituted for notification in *Gazette*, April 18).
 Sec. Lieut. (Hon. Lieut.) C. C. Blizard to be Sec. Lieut., from (O.); June 17, and to be Hon. Lieut.

Lieut. L. G. Bacon relinquishes his commn. on ceasing to be employed, and is permitted to retain his rank; April 8, 1918.

The following relinquish their commns. on ceasing to be employed:—
 Capt. K. H. Marshall (Capt., Lond. R.); Nov. 2, 1918. Lieut. T. P. L. Molloy (Lieut., Dorset R.); June 9. Lieut. R. T. Wilson (Lieut., H.L.I.) T.F.; June 11. Lieut. (Hon. Capt.) E. W. P. Newman (Scott. Rif.); June 12. Sec. Lieut. (actg. Lieut.) M. E. Dunham (Lieut., R. Berks R.); June 14.
 (Then follow the names of 29 officers who are transferred to the Unemployed List under various dates.)

Sec. Lieut. H. J. Coles to take rank and precedence as if his appointment as Sec. Lieut. bore date March 1.

Technical Branch.

Lieut. A. W. Allan to be Lieut., Grade (B), from (Ad.); Aug. 11, 1918 (substituted for notification in *Gazette*, March 28).

Lieut. L. L. W. Smythe to be Lieut., Grade (B), from (Ad.); June 26.

Sec. Lieut. H. G. Burroughs to be Lieut., without pay and allowances of that rank; Dec. 30, 1918.

Sec. Lieuts. to be Sec. Lieuts., Grade (A):—C. H. Marston, from (Ad.); May 28, 1918. L. B. Hogben, from (Ad.); Nov. 7, 1918. E. B. Saunders, from (O.); March 1.

Sec. Lieut. H. G. G. Rawlings (late Gen. List, R.F.C., on prob.) is confirmed in his rank as a Sec. Lieut., Grade (B); Nov. 1, 1918 (substituted for notification in *Gazette*, Nov. 4, 1918).

Lieut. M. P. Spencer (Lieut., Norf. R.) relinquishes his commn. on ceasing to be employed; April 29.

(Then follow the names of 37 officers who are transfd. to the Unemployed List under various dates.)

The initials of Lieut. E. H. Edwards are as now described, and not "E. W.," as stated in *Gazette*, April 25.

The notification in *Gazette* of May 6, concerning Capt. C. D. Butler, is cancelled.

The notification in *Gazette*, June 4, 1918, concerning Flight-Lieut. H. W. Campion (late R.N.A.S.) is cancelled.

The notification in *Gazette*, Jan. 3, concerning Sec. Lieut. H. I. Allen, is cancelled.

The notification in *Gazette*, June 20, concerning Lieut. C. E. Maryon, is cancelled.

Medical Branch.

Transferred to Unemployed List:—Capt. H. T. H. Butt; March 3. Capt. W. F. Walker; April 16. Capt. R. H. Dixon, M.B.; June 3. Lieut. G. M. Mellor; June 25.

Dental Branch.

Lieut. H. Wardill is transfd. to Unemployed List; April 3.

Chaplains' Branch.

Rev. T. L. Beveridge (temp. Chapln. to the Forces, and Ch. R.A.C.D.) is granted a temp. commn. as Chapln., with the relative rank of Capt., and is granted the relative rank of Maj. whilst employed as Asst. Principal Chapln. (Presbyterian); June 5.

Memoranda.

Lieut. H. D. Goldsmith, D.S.O. (Maj., Bt. Lieut.-Col.) (Duke of Cornwall's L.I.) relinquishes his commn. on ceasing to be employed; Jan. 1.

Transferred to Unemployed List:—Sec. Lieut. (actg. Lieut.) J. W. Mayall; April 12. Capt. G. C. V. Hewson; May 14. Capt. G. B. Fraser (King Edward's Horse); June 8. Lieut. R. A. Pennington; June 17. Sec. Lieut. H. Jones, from (S.O.), Maj. H. A. Moore, C.B.E., M.C.; July 1.

Maj. W. J. C. Kennedy-Cockran-Patrick, D.S.O., M.C. (Capt., R. Brig.), resigns his commn. and is permitted to retain his rank; July 9.

The notification in *Gazette*, April 29, concerning Sec. Lieut. (actg. Capt.) J. L. Brown, is cancelled.

(Then follow the names of 421 Cadets granted hon. commns. as Sec. Lieuts.)

London Gazette, July 11

Chief of the Air Staff.—The notification in *Gazette* of June 20 concerning Maj.-Genl. Sir H. M. Trenchard, K.C.B., D.S.O., is cancelled.

Flying Branch

Lieut.-Col. J. C. Halahan, C.B.E., to be Lieut.-Col. (A.), from Group Comdr.; July 1.

Maj. R. A. Bradley to be Lieut.-Col.; Aug. 1, 1918.

Majs. to be actg. Lieut.-Cols. whilst employed as Lieut.-Colonels (A.):—C. H. B. Blount, M.C., A. V. Holt, D.S.O., S. Smith, D.S.O., A.F.C.; May 1.

Maj. G. F. H. Faithfull to be actg. Lieut.-Col. whilst employed as Lieut.-Col. (K.B.) from May 1 to June 9.

Maj. W. J. C. Kennedy-Cockran-Patrick, D.S.O., M.C., to be Maj. (A.), from (S.O.); July 1.

Cpts. to be actg. Majs. whilst employed as Majs. (A.):—G. C. Bailey, D.S.O., W. E. Colison, C. R. Cox, A.F.C., C. C. Durston, J. F. Gordon, D.F.C., C. H. Hayward, P. Huskinson, M.C., G. C. Pirie, M.C., V. A. H. Robeson, M.C., J. G. Selby, M.C., D. F. Stevenson, D.S.O., M.C., It. G. Smart; May 1.

Capt. J. A. Cochrane, M.C., to be actg. Maj. whilst employed as Maj. (K.B.); May 1.

Capt. C. J. Galpin, D.S.O., to be actg. Maj. (A. and S.), without pay and allowances of that rank, whilst specially employed; May 1.

Capt. W. St. J. Scott-Scott to be Capt. (A.), from (S.O.) April 10 (substituted for notification in *Gazette* of June 24).

Lieuts. to be actg. Cpts. whilst employed as Cpts. (A.):—P. J. Barnett, M.C., C. K. M. Douglas, A.F.C., D. W. Grinnel-Milne, A. McGregor, D.F.C., R. K. Morris, M.C., S. E. Toomer; May 1.

Lieuts. to be actg. Cpts. while employed as Cpts. (K.B.):—(Hon. Maj.) G. T. J. Barry, W. R. Phillips, D.F.C.; May 1.

Lieut. (Hon. Capt.) E. H. Grant to be Lieut. (A.), from (S.O.); June 2.

Lieut. (actg. Capt.) H. E. Hazlehurst to be Lieut. (A.), from (T.), and to relinquish actg. rank of Capt.; Sept. 23, 1918 (substituted for notification in *Gazette* Oct. 4, 1918).

Lieut. L. V. Dell to be Lieut. (O.), from (Ad.); May 15.

177155 Flight Cdt. F. W. Carter is granted a temp. commn. as Sec. Lieut. (O.); Sept. 27, 1918.

Sec. Lieut. C. H. Taylor (Capt., I.A.R.O.) relinquishes his commn. on reversion to I.A.R.O.; May 20.

The following relinquish their commns. on ceasing to be employed:—Lieut. S. C. Burt (Lieut., Brit. Col. R.); April 9. Sec. Lieut. (Hon. Lieut.) G. W. F. W. Downer (Lieut., R.H. and R.F.A.); May 17. Lieut. T. H. Wickett (Lieut., W. Ont. R.); May 31. Lieut. R. P. Baker (Capt., Brit. Col. R.); June 9. Lieut. G. C. T. Hadrill (Lieut., R.A.S.C.); June 18.

Lieut. (Hon. Capt.) D. S. Inglis (Lieut., Gord. Highrs.); June 23. Sec. Lieut. (Hon. Lieut.) W. V. Tyrrell (Lieut., R.I. Rif.); June 24. Lieut. H. M. Tulloch (Lieut., I.A.) June 27. Lieut. J. P. Cunningham (Lieut., Alberta.); July 2.

(Then follow the names of 215 officers who are transfd. to the Unemployed List under various dates. We regret that owing to great pressure on our space, it is impossible to reprint this portion of the List.—Ed.)

Lieut. W. A. Stead relinquishes his commn. on account of ill-health contracted on active service, and is permitted to retain his rank; June 25.

The following Sec. Lieuts. relinquish their commns. on account of ill-health, and are permitted to retain their rank:—F. A. Maples; April 10 (substituted for the notification in the *Gazette* of Jan. 28). W. A. Gurr; April 29. C. G. Parmelee (caused by wounds); June 26. J. R. Roulston (contracted on active service); July 3. H. S. Dyson; July 4 (substituted for the notification in the *Gazette* of Jan. 31). E. R. Moore (contracted on active service); July 9.

The initials of Sec. Lieut. W. J. Cairns are as now described, and not "W. G.," as stated in *Gazette* May 6.

The surname of H. C. Biard is as now described, and not as stated in *Gazette* July 30, 1918.

The surname of Lieut. (Hon. Capt.) E. C. Fernandes-Ferreira is as now described, and not as stated in *Gazette* May 16.

The notification in *Gazette* May 31, 1918, concerning Sec. Lieut. K. R. Campbell is cancelled. The notification in *Gazette* March 4 concerning Lieut. J. E. Burke is cancelled. The notification in *Gazette* March 21 concerning Sec. Lieut. R. P. Stockton is cancelled. The notification in *Gazette* April 1 concerning Sec. Lieut. N. H. Midgley is cancelled. The notification in *Gazette* April 1 concerning Lieut. E. H. Tredcroft, D.F.C., is cancelled. The notification in *Gazette* April 4 concerning Sec. Lieut. J. D. Scott is cancelled. The notification in *Gazette* April 25 concerning Sec. Lieut. S. B. Milner is cancelled (the notification in *Gazette* April 15 to stand).

The notification in *Gazette* April 29 concerning Sec. Lieut. W. V. Thomas is cancelled. The notification in *Gazette* May 6 concerning Lieut. (actg. Capt.) D. Sutherland is cancelled (the notification in *Gazette* March 21 to stand). The notification in *Gazette* May 13 concerning Sec. Lieut. M. D. McTaggart is cancelled (the notification in *Gazette* June 24 to stand). The notifications in *Gazette* May 30 (page 6658) concerning Sec. Lieut. F. E. Power are cancelled. The notification in *Gazette* June 6 concerning Sec. Lieut. (Hon. Lieut.) R. B. Francis (Lieut., Can. M.G.C.) is cancelled (the notification in *Gazette* May 6 to stand). The notifications in *Gazettes* Jan. 21 and June 20 concerning Capt. G. L. Hartgill are cancelled (the notification in *Gazette* June 17 to stand). The notification in *Gazette* July 1 concerning Lieut. E. S. C. Sen is cancelled.

Capt. E. N. E. Waldron to be Capt., from (S.O.); May 1.

Sec. Lieut. E. R. Webb to be graded for purposes of pay and allowances as Capt., whilst employed as Capt.; May 1.

H. Milman (Capt., R.E.) is granted a temp. commn. as Sec. Lieut.; May 27, 1918, and to be Hon. Capt. (substituted for the notification in *Gazette* Dec. 10, 1918).

Sec. Lieut. J. W. Thompson (late Gen. List, R.F.C., on prob.) is confirmed in rank as Sec. Lieut.; Dec. 10, 1918.

The following are granted temp. commns. as Sec. Lieuts.:—F. G. L. Heyes; June 24. W. Graham; July 4. E. C. A. Clarke, W. Macpherson, C. S. Roads; July 7.

The following relinquish their commns. on ceasing to be employed:—Capt. H. B. S. Stephenson (Capt., R. Mun. Fus.); Nov. 23, 1918. Sec. Lieut. (Hon. Lieut.) F. H. Sibley (Capt., R.F.A.); June 13. Lieut. J. T. Wright (Lieut., R.N.); June 25.

(Then follow the names of 41 officers who are transfd. to the Unemployed List under various dates.)

Lieut. L. G. Hall relinquishes his commn. on account of ill-health contracted on active service, and is granted the rank of Capt.; June 12.

Lieut. L. D. Brown relinquishes his commn. on account of ill-health contracted on active service, and is permitted to retain his rank; June 30.

Sec. Lieut. H. T. Wellard relinquishes his commn. on account of ill-health, and is permitted to retain his rank; July 3.

The rank of Lieut. F. R. T. Pearson is as now described, and not Sec. Lieut. as stated in the *Gazette* of March 21.

The notification in the *Gazette* of June 10 concerning Sec. Lieut. R. C. E. Verne de is cancelled.

Technical Branch

Capt. A. C. Baker to be actg. Maj. whilst employed as Maj., Grade (A.), from April 1, 1918, to March 12.

Lieut. H. E. Hazlehurst to be actg. Capt. whilst employed as Capt., Grade (A.); Sept. 16, 1918 (substituted for notification in the *Gazette* of Nov. 29, 1918).

Lieut. H. E. Hazlehurst to be actg. Capt. whilst employed as Capt., Grade (A.), from (A.), from Dec. 11, 1918, to April 30.

Sec. Lieuts. to be graded for purposes of pay and allowances of Cpts. whilst employed as Cpts., Grade (A.):—(Hon. Lieut.) J. Drew, (Hon. Capt.) R. C. Fowler, T. E. Morton; May 1.

Sec. Lieuts. to be graded for purposes of pay and allowances as Lieuts. whilst employed as Lieuts., Grade (A.):—G. J. C. W. Fitzwilliam, L. T. Bulmer; May 1.

Sec. Lieut. J. R. Hovenden to be Lieut., without pay and allowances, of that rank; Aug. 28, 1918.

Sec. Lieut. C. R. Booth to be Sec. Lieut., Grade (A.), from (Ad.); Feb. 22.

Sec. Lieut. F. S. Read to be Sec. Lieut., Grade (B), from (Ad.); Oct. 1, 1918.

Sec. Lieut. (Hon. Lieut.) C. O. Wright (Lieut., King's Own R. Lances R.) relinquishes his commn. on ceasing to be employed; June 10.

(Then follow the names of 52 officers who are transfd. to the Unemployed List under various dates.)

Sec. Lieut. (Hon. Lieut.) F. J. Colishaw relinquishes his commn. on account of ill-health contracted on active service, and is permitted to retain the rank of Lieut.; July 3.

The notification in *Gazette* of April 25 concerning Sec. Lieut. F. E. Miles is cancelled; notification in *Gazette* of April 15 to stand.

The notification in *Gazette* of June 13 concerning Lieut. J. W. McKee is cancelled.

Medical Branch

A. G. Graham is granted a temp. commn. as Capt.; July 18, 1918 (substituted for notification in *Gazette* of July 19).

Transferred to Unemployed List.—Capt. M. R. Dobson; April 25. Capt. T. R. F. Kerby; June 29. Maj. H. F. Horne; July 2.

Dental Branch

Capt. J. Barratt is transfd. to Unemployed List; May 29.

Memoranda

Sec. Lieut. J. Keyes to be Lieut.; May 22.

Lieut. (Hon. Capt.) E. H. Grant (Capt., Arg. and Suth'd. Highrs.) relinquishes his commn. on ceasing to be employed; July 3.

Sec. Lieut. C. W. Kerr to take rank and precedence as if his appointment as Sec. Lieut. bore date May 1, 1918.

(Then follow the names of eight officers who are transfd. to the Unemployed List under various dates.)

SIDE-WINDS

THE recent epoch-making flight of the Vickers-Vimy machine across the Atlantic was an endurance test, especially for the Rolls-Royce engines. It is well known that the makers of the Rolls-Royce engines leave no stone unturned to secure the best, both as regards materials and workmanship. That is why Firth's alloy steels entered so largely into the construction of the Rolls-Royce engines which accomplished the Atlantic flight. In our last issue, Messrs. Thos. Firth and Sons, Ltd., inserted an announcement dealing with this point, but unfortunately, by a compositor's error, the words "Firth's Stainless Steels" were inserted in the centre of the advertisement. Firth's stainless steels have merits of their own, and there is no necessity for them to borrow any of the glory won by Firth's alloy steels.

THE 1919 edition of "Willings' Press Guide," published recently, is increased in price to 2s., but is still marvellously good value to all who have occasion to turn-up the names, addresses or publishing dates of the less well-known newspapers, etc. It is fatter than ever, but just as well printed and conveniently arranged and indexed.

Surplus, the official organ of the Surplus Government Property Disposal Board of the Ministry of Munitions, now in its fourth number, is illustrated with a number of photographs showing a few of the articles and things to be sold. Those who are on the look-out for materials of all sorts will, doubtless, find this little magazine very interesting. It is published on the 1st and 15th of each month, and is sold at all bookstalls and newsagents at 3d.

WE understand from Mr. J. G. Navarro, who has just severed his connection with the recently formed company, Navarro Wellesley Aviation, Ltd., Kingston-on-Thames, that he is now devoting his time to a new type of aircraft; at the same time, having some capital, he will be pleased to get into touch with any firm or individual with a view to developing their aeronautical interests either at home or abroad. Elsewhere in this issue Mr. J. G. Navarro's announcement appears with all particulars.

QUITE a new note for catalogues is struck by Messrs. Gamage's "Rules for Brighter Cricket," pictured by "Rip," with a few asides on other sports and pastimes. The actual catalogue portion is confined to two pages, while the rest is taken up with full-page sketches in the cartoonist's happiest vein. There is sure to be a run on this unique publication and any of our readers who wish to be certain of a copy should make early application.

DURING the last few weeks, the Gosport Aircraft Co. have been busy delivering a batch of F 5 (Porte type) flying-boats, each fitted with two 350 h.p. Eagle Rolls-Royce engines. The first of them, after a preliminary taxi to warm up, got away after a short run of about 60 yards with a load of 190 gallons of petrol, and a crew of five, including Mr. Charles Nicholson, a director, and Mr. M. H. Volk, engineer and general manager of the firm. Lieut. D. V. Cranegie, A.F.C.,

A Clothing Invention

AT a meeting on July 14 of the Royal Commission on Awards to Inventors, Mr. Justice Sargent in the Chair, Messrs. Robinson and Cleaver put in a claim in respect of suits for aviators.

For the claimants, it was stated that these suits enabled aviators to fly to great heights, and were superior to former suits in regard to the protection afforded to parts of the body. The claimants had been asked to waive any claim in respect of large orders received, and had replied in June, 1918, that they must reserve the right to charge a royalty on orders given to other contractors.

Mr. J. J. Evans, giving evidence for the firm, agreed that the prices paid to other firms were 12s. 6d. less than the price paid to his firm, but pointed out that Robinson and Cleaver had had to organise labour on a very extensive scale. They had to take additional factories to cope with the many orders.

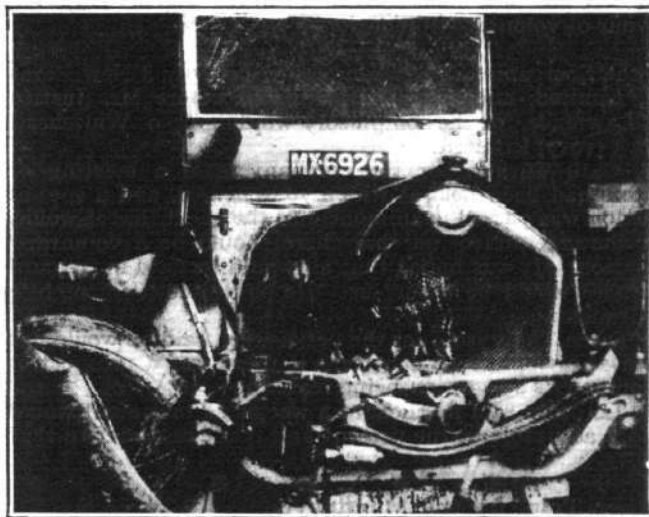
Mr. A. F. Smith, assistant to the Government Contracts Department, called for the Crown, said that 25,829 suits had been supplied by Robinson and Cleaver, the average price per suit being £7 5s. 11d. The total number supplied by other contractors was 16,413, at an average price of £6 9s. 2d.

Mr. Trevor Watson said that there was no suggestion that the claimants' prices were unfair. He raised the point to

R.A.F., has been the pilot, and on some of the tests has taken up as many as seven passengers. The flying-boats were delivered to various east coast stations.

MESSRS. C. C. WAKEFIELD AND Co., LTD., are very proud of the fact that "Castrol" was exclusively used on the R.34, and they were very interested in the following extract from a message from the *Daily Telegraph* correspondent at New York: "The Weather Bureau here works with the utmost personal goodwill, because, to quote its officers, 'England has shown the United States remarkable courtesy in allowing an American observer to travel both ways on the first flight, and also given us every information down to samples of the castral oil for engine-bearings, which we want to analyse for our own purposes.'" But they are wondering why our American friends did not apply to Wakefield House!

MESSRS. S. SMITH AND SONS (M.A.), LTD., advise us that their branch managers from Australia, New Zealand, Italy, Siam and Scandinavia are at present in London considering post-War problems connected with their extensive business, and at the same time are negotiating with various firms throughout the country for sole representation of their goods abroad. Messrs. S. Smith and Sons (M.A.), Ltd., are still open to undertake several additional sole agencies, and manufacturers interested will be well advised to get into touch with their export department at 179-185, Great Portland Street, London, W. 1.



"No flyer," but a very necessary adjunct to aviation. The photograph shows a Crossley tender which ran into a tramcar at Cricklewood last week and was badly damaged. The Triplex wind-screen, it will be seen, was cracked, but did not "fly" or "splinter," so no one was hurt by flying glass

show that there was no question of royalty on these suits, and also to bring out the fact that they had some advantage on the contracts received from the Government. The claim for 5s. a suit was equal to 4 per cent. on the value of the article. He suggested that a lump sum should be fixed, but if the award were to be on a royalty basis at all something like 1 per cent. was sufficient. He did not dispute the fact that the design had been of considerable value to His Majesty's forces.

The Commission reserved their decision.

Sinking a German Submarine

IN the Prize Court on July 14, Lord Sterndale made an order granting a bounty of £125 to the officers of H.M. Seaplane 8663 for the sinking of U.C. 36. According to an affidavit by Capt. Henry George Boswell, D.S.C., R.A.F., on May 20, 1917, he was in command, jointly with Capt. Charles Reginald Morrish, D.S.C., R.A.F., of H.M. Seaplane 8663, when he sighted an enemy submarine 20 miles E.N.E. of the North Hinder Lightship in the North Sea. The seaplane attacked the submarine with bombs, two of which struck her, and she sank by the stern. There were no survivors. The submarine had been ascertained to be the U.C. 36, manned by 25 hands.

Mr. T. H. T. Case, on behalf of the Procurator-General, said that the claim was not opposed.

COMPANY MATTERS

J. Samuel White and Co., Ltd.

THE directors of J. Samuel White and Co., Ltd., East Cowes, I.W., recommend a final dividend of 4s. 6d. per share, less income tax.

The annual general meeting will be held at the registered offices at Cowes on August 25 at 12 o'clock noon, and dividend warrants will be posted on that date.

Whitehead Aircraft (1917) Limited

AN extraordinary general meeting of Whitehead Aircraft (1917) Limited was held on July 11 to consider a resolution "That the company be wound up voluntarily and that liquidators be appointed."

Lord Wemyss, who presided, said he had not been informed of the unseaworthiness of the vessel of which he took command. He recommended the shareholders to carry the resolution of voluntary liquidation, so as to preserve the company's assets. He alluded to a proposal by Mr. Ambrose Taylor, who, he said, was not a philanthropist, but a business man, and proposed fair terms. Mr. Taylor was now investigating the books of the company. He had been told that various accusations had been made to the effect that all money subscribed had not gone into the coffers of the company. He had ascertained that that was not the fact. He concluded by moving the resolution, which was seconded by Maj.-Gen. Sir Henry de Bras.

A shareholder proposed that the winding up should be compulsory, so that the affairs of the company might be investigated, and this resolution was carried by a show of hands. A poll was demanded and showed a great majority in favour of voluntary liquidation.

In the Companies Winding-up Court on July 8 New Pegamoid, Limited, and another petitioned, before Mr. Justice P. O. Lawrence, for the compulsory winding-up of Whitehead Aircraft (1917) Limited.

Mr. Cecil Turner, for the company, said a meeting of creditors had been held at which 70 appeared, and a special resolution was passed unanimously to the effect that it would be in the interests of all that there should be a voluntary liquidation. It was hoped that all would be paid in full and that there would be a surplus. He suggested a fortnight's adjournment.

Mr. Owen Thompson, for the petitioners, said he would not oppose a fortnight's adjournment if there was a prospect of the company's suggestion being realised.

His Lordship said he thought a week's adjournment would be more advisable at the present and made an order to that effect.

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Another Trial by the Martinsyde

MESSAGES from St. John's during the week-end indicated a possibility of an attempt on the Transatlantic flight by the Martinsyde, but after an hour's trial flight on July 14 Mr. Raynham decided that the radiator was still not satisfactory, and the start was postponed.

The Canadian Air Force

THE Canadian authorities are being urged by Brig.-Gen. Odium to hurry on the organisation of a small but efficient Canadian Air Force, as he fears that otherwise Canadian pilots will go to other countries to take up civil occupations.

Aerial Services in Argentina

AN aviation company has been formed at Buenos Aires, mainly with British capital obtained locally, to establish a regular air service between Buenos Aires and Montevideo.

Rome to Tokyo by Air

AN announcement in the *Popolo Romano* indicates that Signor Gabriele d'Annunzio has accepted the post of Director of Civil Aviation in Sardinia, and that he will shortly undertake a flight from Rome to Tokyo. The flight is expected to take 14 days, and the route will be via Asia Minor, India, Tonkin, and China.

Aerial Services in Germany

THE Prussian Minister of Commerce has sanctioned the establishment of a company for aerial traffic which will have its seat at Frankfurt-on-Main, states the *Morning Post* correspondent at Amsterdam. The capital of the company, it is said, has been fixed at 15,000,000 marks. The promoters of the company are negotiating at present with the authorities for planning out six routes for the despatch of letters with Cologne as the chief distributing centre.

Eventually a service for passengers will also be established. The following routes are under consideration:—Cologne-Frankfurt-Munich, Cologne-Stuttgart, Cologne-Basle, Cologne-Hamburg, Cologne-Berlin, and Cologne-Breslau. It is proposed to open the service with a fleet of about 200 machines.

Aeronautical Specifications Published

Abbreviations:—cyl.=cylinder; I.C.=internal combustion; m.=motors.

APPLIED FOR IN 1917

The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

- Published July 10, 1919
- 8,272. WARING AND GILLOW and W. H. RICHMOND. Spars, struts, etc. (127,874.)
 - 8,309. A. TAYLOR and P. W. GRAY. Sighting devices for aircraft. (127,877.)
 - 8,411. E. R. CALTHROP. Parachutes. (127,881.)
 - 8,482. SOC. ANON. MATERIAL TELEPHONIQUE. Telephone apparatus for use on aeroplanes. (127,884.)
 - 8,846. G. F. JOSEPH, PORTHOLME AERODROME and F. DE PAPE. Wings. (127,898.)
 - 8,955. VICKERS, LTD. and T. S. DUNCAN. Landing devices. (127,904.)
 - 8,956. D. ANDERSON. Aeroplanes, seaplanes, etc. (127,905.)
 - 8,990. BARR and STROUD, A. BARR and W. STROUD. Height-finders for anti-aircraft gunnery, etc. (127,907.)
 - 9,054. AERONAUTICAL INSTRUMENT CO. and G. BREWER. Balloons. (127,910.)
 - 9,069. LEYLAND MOTORS, LTD., and J. G. P. THOMAS. I.C. engines for aircraft. (127,911.)
 - 12,279. O. A. DANIELSON. Indicators. (127,917.)
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- 9,323. C. LANE. Mountings of guns for use on aeroplanes. (128,244.)
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 - 9,789. G. HERVIEU and P. M. G. MARECHAL. Portable sheds, hangars, etc. (128,266.)
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 - 9,963. H. DREYFUS. Fabric for aircraft. (128,274.)
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 - 10,192. A. LAMBLIN. Radiators for I.C. engines for aircraft. (128,281.)
 - 10,230. SOPWITH AVIATION CO. and H. A. KAUPER. Synchronisation of firing of gun with rotation of propeller. (128,283.)
 - 10,414. C. BIRAULT. Sighting instrument. (128,290.)
 - 10,420. R. A. BRUCE. Fastenings of detachable or foldable wings. (128,291.)
 - 10,473. E. R. CALTHROP. Bomb dropping devices. (128,293.)
 - 10,474. E. R. CALTHROP. Apparatus for destroying aerial craft. (128,294.)
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